

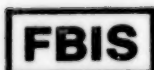
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2 August 1979

Japan Report

No. 74

JFY 1979 S & T Budget



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JAPAN REPORT

No. 74

JFY 1979 S & T BUDGET

Tokyo KOGYO GIJUTSU [Industrial Science and Technology] in Japanese Vol 20 No 3, Mar 79 pp 8-39

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SCIENCE AND TECHNOLOGY

OUTLINE OF JFY 1979 BUDGET FOR SCIENCE, TECHNOLOGY

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 8-11

[Article by Technology Survey Section, Agency of Industrial Science and Technology: "Outline of JFY 1979 Science and Technology Promotion Outlays"]

[Text] Outline

- 1) The general account budget proposal for JFY 1979 was decided at the cabinet level meeting of 11 January.
- 2) As shown in Table 1, the total sum of science and technology promotion funds in the general account budget for JFY 1979 is 347.1 billion yen which represents an increase of 37.7 billion or 12.2 percent increase over the preceding year's 309.4 billion yen. It can be broken down in the following manner. Costs of operating the experimental research organs will be 145 billion yen (119.6 billion yen last fiscal year, 21.3 percent increase), subsidy funds and government capital outlays total 92.6 billion yen (8.3 percent increase over last year's 85.4 billion yen), administrative costs for promoting science and technology and associated costs total 12.2 billion yen (a 16.1 percent increase over last year's 10.5 billion yen), space expenditures 88.5 billion yen (2.6 percent over the preceding year's 86.3 billion), nuclear energy related costs 8.8 billion yen (16.5 percent increase over previous year's 7.5 billion yen).
- 3) In addition, there are funds amounting to 168.2 billion yen (141.4 billion yen the previous year, 18.9 percent increase) available for research and development in energy measures funds other than the above, and these include nuclear energy related funds of 158.3 billion yen (133.8 the previous year, 18.3 percent increase) and subsidies and government capital outlays of 9.9 billion yen (7.6 billion the previous year, 30.8 percent increase).
- 4) The total of the above mentioned science and technology promotion funds and the funds for research and development incorporated within energy measures fund (corresponding to the science and technology promotion fund of the past) is 515.3 billion yen (450.7 billion yen the preceding year), and this is an increase of 14.3 percent.

Breakdown According to Items

A breakdown of the science and technology promotion funds by items is shown in Fig 1. It can be seen that nuclear energy related funds showed an increase of 18.9 percent over the previous year, and this was the result of the large increase in promotion of fusion energy research and development which was granted 24.0 billion yen (99.8 percent increase over the previous year) and 46.1 billion yen for the nuclear fuel policy (17.1 percent increase over the previous year). The funds for experimental research organs (21.3 percent increase) and subsidies (8.3 percent increase) also show orderly increases, but space development funds are seen to run along at about the same level as the preceding year. This was the result of the promotion of rocket development being limited to 28.7 billion yen (4.8 percent increase).

Breakdown According to Ministries and Agencies

The breakdown of the science and technology funds according to different ministries and agencies is given in Fig 2. This figure shows the Ministry of International Trade and Industry to be the recipient of 81.2 billion yen--15.8 percent of the total science and technology promotion fund--a 27.9 percent increase over the preceding year (see the following article for more on the Ministry of International Trade and Industry). Looking at the other ministries and agencies with substantial increases in their share of the science and technology promotion fund, the Science and Technology Agency received an increase of 13.0 percent, Ministry of Agriculture, Forestry and Fisheries an increase of 10.2 percent, Ministry of Education 13.7 percent, and the Ministry of Health and Welfare 14.1 percent. (Data taken from the JFY 1979 Outline of the Science and Technology Promotion Fund.)

(Technology Survey Section, Agency of Industrial Science and Technology)

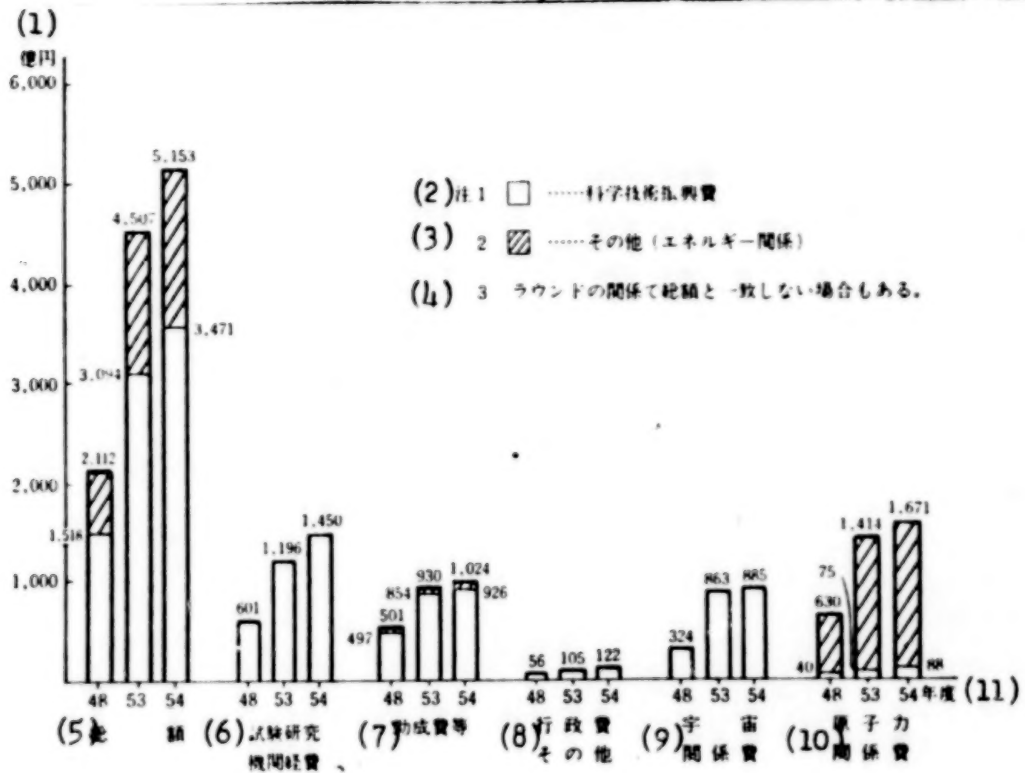
Table 1. Budget Proposal for JFY 1979 Science and Technology Promotion Fund (Summary Table)

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- Key: 1. classification 2. by ministry and agency 3. item
- 4. experimental research organ personnel
 - 5. experimental research organ expenses
 - 6. science and technology promotion fund 7. subsidies, etc.
 - 8. administrative and others 9. space related funds
 - 10. nuclear energy related funds 11. subtotal
 - 12. rate of increase over previous year (%)
 - 13. others (energy related) 14. total B + B'
 - 15. unit (1000 yen)
 - 16. Diet
 - 17. Prime Minister's Office
 - 18. National Police Agency
 - 19. Hokkaido Development Agency
 - 20. Economic Planning Agency
 - 21. Science and Technology Agency
 - 22. Environment Agency
 - 23. Ministry of Justice
 - 24. Ministry of Foreign Affairs
 - 25. Ministry of Finance
 - 26. Ministry of Education
 - 27. Ministry of Health and Welfare
 - 28. Ministry of Agriculture, Fisheries and Forestry
 - 29. Ministry of International Trade and Industry
 - 30. Ministry of Transport
 - 31. Ministry of Post and Telecommunications
 - 32. Ministry of Labor
 - 33. Ministry of Construction
 - 34. Ministry of Home Affairs
 - 35. subtotal A
 - 36. others (energy related)
 - 37. Science and Technology Agency
 - 38. Ministry of Foreign Affairs
 - 39. Ministry of International Trade and Industry
 - 40. future-year obligatory authority
 - 41. total A + A'
 - 42. rate of increase over previous year
 - 43. Note 1) the personnel column is for workers at the research organs in which the figure in the upper row () is the amount of the lower row strictly in the research area
 - 44. 2) [see 40 above]
 - 45. 3) this table was compiled by the Agency of Industrial Science and technology

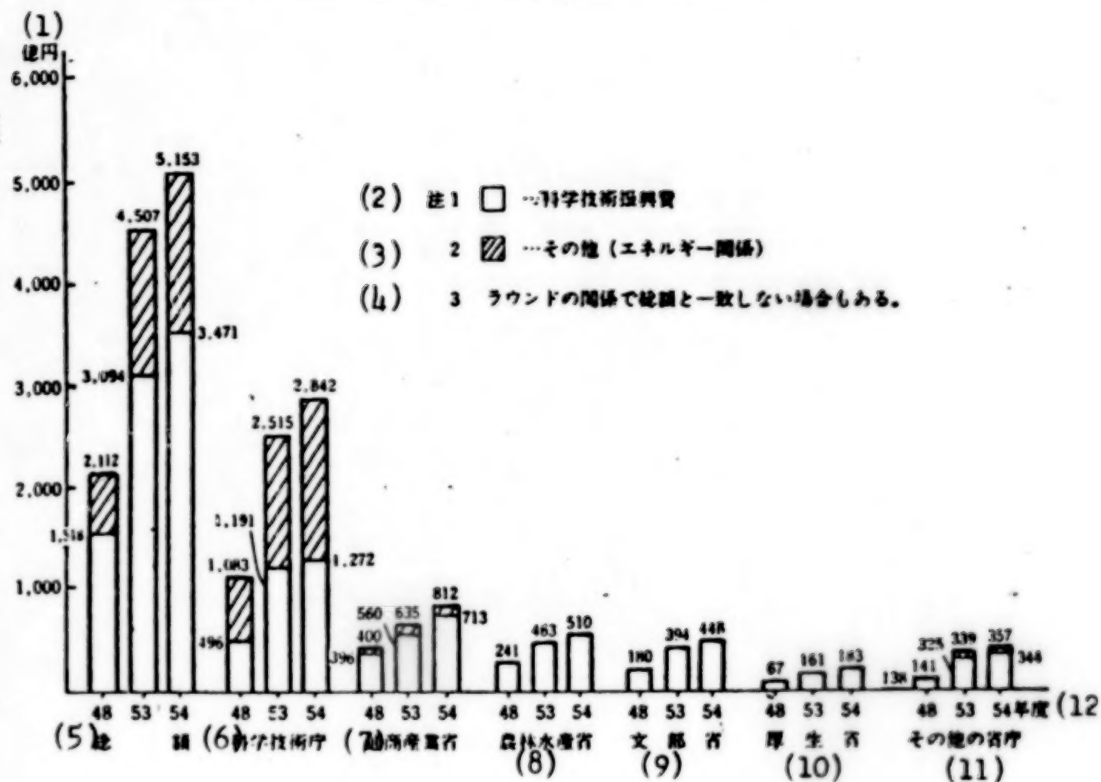
Figure 1. Breakdown of Science and Technology Promotion Fund by Items



Key to Figure 1

1. 100 million yen
2. Note 1 Science and Technology Promotion Fund
3. others (energy related)
4. due to rounding off of values, total may not add true
5. total sum
6. experimental research organ funds
7. subsidies, etc.
8. administrative and others
9. space related funds
10. nuclear energy related funds
11. JFY

Figure 2. Breakdown of Science and Technology Promotion Funds by Ministry and Agency



Key: 1. 100 million yen 2. Note 1 Science and Technology Promotion Fund
 3. others (energy related)
 4. due to rounding off of values, totals may not add true
 5. total sum 6. Science and Technology Agency
 7. Ministry of International Trade and Industry
 8. Ministry of Agriculture and Forestry
 9. Ministry of Education 10. Ministry of Health and Welfare
 11. other ministries and agencies 12. JFY

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SCIENCE AND TECHNOLOGY

OUTLINE OF AIST'S JFY 1979 BUDGET PRESENTED

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 12-13

[Article by General Affairs Section, Agency of Industrial Science and Technology: "Agency of Industrial Science and Technology Budget"]

[Text] I. Introduction

Our country's economy is presently finally on the road to recovery from a long period of recession. However, there are still short-term problems such as sluggish industrial activity and a deepening unemployment situation and long term problems in the nature of long-term stability of the resources and energy supply situation and the fostering and reinforcement of next generation leading technology.

The role of technological development to overcome this situation and furnish the prime power for the prosperity and development of economic society is very large. At the same time, there are great hopes worldwide that technological development will be an effective means to break through this world wide stagnation in the economic society.

Based on the above viewpoints, the Agency of Industrial Science and Technology will place its emphasis on the following policies during the JFY 1979.

JFY 1979 Agency of Industrial Science and Technology Related Budget (Outline of Original Government Proposal)

(Budget)

General Account 72,624 million yen (53,454

Special Account for Specified National Assets and Facilities 29,753 million yen (41,177)

(Related Budget)

Special Account for Coal and Oil	3,586 million yen (418)
Special Electric Power Development Account	2,569 million yen (2,209)
(Fiscal Investment Loan)	48.000 million yen (42,000)

II. Emphasized Policies

1. Construction of Agency of Industrial Science and Technology's Tsukuba Research Center and Transfer of Experimental Research Organs to this Center

The construction of the Tsukuba Research Center facilities will be pushed, the transfer of the experimental laboratories presently located in Tokyo will be smoothly made, provision of a research system of international level will be set up, and technological development will be basically reinforced in this manner.

Special Account for Specified National Assets and Facilities	29,753 million yen (41,177)
Fraction from General Account	59 million yen (129)
Costs Related to Move to the Tsukuba Center	16,025 million yen (0)

2. Promotion of the Sunshine Plan

Development of technology to utilize new forms of energy such as solar energy, geothermal energy, coal energy, and hydrogen energy will be promoted vigorously including construction of pilot plants in order to seek stable long-term supplies of energy. At the same time, lateral and bilateral international cooperative efforts will be promoted.

New Energy Technology Research and Development Costs	7,059 million yen (5,502)
Special Account for Promotion of Electric Power Development	2,365 million yen (2,209)
Special Account for Coal and Oil Measures	2,507 million yen (418)

3. Promotion of the Moonlight Plan

The Moonlight Plan is a comprehensive plan for development of energy conservation technology including large-type energy conservation technology research and development and assistance for developing energy conservation technology to the private sector that will actively promote the effective utilization of energy through effective transformation of energy and its effective utilization by both industry and the people. Energy Conservation Technology Research and Development Costs: 2,771 million yen (1,978) Special Account for Promotion of Electric Power Sources Development (high efficiency gas turbine NO_x and other similar treatment technology reliability demonstration experiments survey costs): 205 million yen (0).

4. Expansion, Reinforcement of Large Projects

Large scale technological development of strong leading nature required for the national economy is continued by the large project system in which the country is the main body to promote the system with the close cooperation of the industrial and academic worlds. A new project in the form of "optical application instrumentation and control system" will be a new research and development program that will be undertaken during JFY 1979 along with research on eight continuing projects.

Cost of Large Industrial Technology Research and Development

13,736 million yen (13,852)

Special Account for Coal and Oil Measures (Contracted Research on Undersea Oil Production System)

1,079 million yen (0)

5. Promotion of International Technological Cooperation

Research cooperation with leading industrial countries being actively promoted includes multilateral cooperative efforts through IEA centered mainly on energy related matters and bilateral cooperative efforts such as between the United States and Japan and Australia and Japan.

Cooperation with developing countries takes the form of activating the potentials of experimental research organs in which joint research and acceptance of trainees are being reinforced and expanded.

Fund for Promoting International Technology Exchange 107 million yen (77)

Fund 3 by the Ministry of International Trade and Industry Policy Bureau

248 million yen (159)

6. Promotion of Research and Development of Medical Treatment Equipment Technology

Research and development will be promoted on low cost and high performance medical treatment equipment in order to lower the cost of medical treatment, reduce manpower required in medical treatment related areas, improve the welfare of hospitalized patients, and provide full scale medical treatments. The development of four pieces of equipment will be continued in JFY 1979 along with research and development on four new types of equipment including a position discharge nuclide horizontal cross sectional layer device (positron CT).

Cost of Research and Development on Medical Treatment Equipment Technology
812 million yen (810)

7. Promotion of Private Sector Technology Development

The potential of the private sector will be exploited in order to resolve various problems that now face the country as prevention of pollution and handling the problems associated with resources and energy as well as to develop long term subjects designed to raise the industrial structure to higher levels.

Subsidy for Important Technological Research and Development

3,231 million yen (3,246)

Funds for Domestic Technology Promotion Advanced by the Japan Development Bank

48,000 million yen (42,000)

8. Filling Out Functions of Experimental Laboratories

Research will be conducted in experimental laboratories to respond to requests of society for items such as pollution prevention or earthquake prediction as

well as administrative needs in the industrial standardization area together with the development of seeds of leading technology such as bionics to fulfill roles of national laboratories.

Special Research Funds (Agency of Industrial Science and Technology budget)	7,355 million yen (8013)
Budget of Other Ministries and Agencies	2,563 million yen (2,399)
Future-Year Obligational Authority	880 million yen

9. Reinforcement of Industrial Standardization Policy

The demand for industrial standardization systems such as consumer protection, material improvement in the people's living, attainment of good social environment, energy conservation, and conservation of resources has recently assumed multiple nature. The Japan Industrial Specifications system will be upgraded, the JIS mark display system will be reinforced, and international standardization efforts, clothing dimensional survey, and their standardization will be promoted in order to effect large degree of energy conservation based on a long term plan for promoting industrial standardization that will be conducted to comply with the situation mentioned above. In addition actual testing of items such as retread automobile tires will be started anew.

Industrial Standardization Cost	607 million yen (565)
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10. Drafting of Industrial Technology White Paper

Analysis of the present status that envelopes industrial technology and their problem areas as well as analysis of research and development activities on the part of the private sector will be conducted, and the future directions to be taken in the industrial technology policy will be clarified.

Cost of Drafting Industrial Technology White Paper	1 million yen (0)
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11. Promoting Spin-Off of Results

The results of contract research and development in support of the 16 experimental laboratories under the jurisdiction of the Agency of Industrial Science and Technology, large projects, Sunshine Plan, and Moonlight Plan will effectively be converted to industrial property rights and efforts will be made to actively make use of the research results.

Costs of Results Spin-Off Measures	87 million yen (86)
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12. Development of Electronic Computer Utilization Technology

Technological societies will be promoted for the utilization of electronic computers, and the various technological problems that need to be resolved to enable higher level utilization of electronic computers at the government ministries and agencies will be surveyed and researched. The development of resource sharing system utilization technology and the dispatching of trainees overseas will be conducted.

Electronic Computer Utilization Technology Development	64 million yen (65)
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(General Affairs Section, Agency of Industrial Science and Technology)

SCIENCE AND TECHNOLOGY

OUTLINE OF MOONLIGHT PROGRAM PRESENTED

Tokyo KOGYO CIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 14-17

[Article by Office of the Comprehensive R & D Officer: "Moonlight Program"]

[Text] Outline

The development and introduction of substitute forms of energy and measures to assure stabilized supply of oil are necessary to resolve the energy problem along with the promotion of an effective energy conservation policy on the demand front.

In the promotion of energy conservation, there is need not only to insure rational use of energy but to restructure equipment using energy and processes in which energy is used so less energy is consumed and to convert to a highly energy efficient power generation mode. In this manner, the role of development of energy conservation technology is very large.

To this end the Agency of Industrial Science and Technology initiated in JFY 1978 an energy conservation research and development system (Moonlight Program) to engage in research and development on large scale energy conservation technology and development on leading and basic energy conservation technology that are the foundation for such technology under the form of a national project. At the same time, energy conservation research and development by private groups have been subsidized, and the standardization of energy conservation is being promoted in comprehensive manner.

At the same time, this agency has been participating in the energy cascading project under the IEA (International Energy Authority) in order to reinforce international cooperation in the area of energy conservation technology research and development. Participation in still another project in the study of a modified type heat pump system has been initiated in JFY 1979, and participation in international cooperative efforts is being reinforced.

A total funding of 2,771 million yen has been allocated in JFY 1979 from the overall government general accounts budget (government draft) to implement this program.

Furthermore, 205 million yen has been assigned as a Moonlight Program related budget in the special fund for promotion of power sources development for NO_x treatment as well as reliability demonstration experiments on the high efficiency gas turbine (see Table).

1. Research and Development on Large Type Energy Conservation Technology

The effect of energy conservation is very great, and it is associated with high sense of urgency. However, there also are large risks involved such as the need for large sums of money and long duration of research and development efforts as a result of which this is a type of technological research and development that cannot be thoroughly accomplished by private industry alone. As a result, it is being conducted through research and development at the government experimental laboratories and research and development contracted out to the private sector with the efforts in the two areas organically coupled together. Research and development on the following projects is now being promoted.

1) Magnetohydrodynamic (MHD) Power Generation

MHD power generation is characterized in that electrical energy is obtained directly from thermal energy without a mechanical conversion step. When put in tandem with a steam power plant of a type of the past, overall thermal efficiency can be raised to over 50 percent making it an epochmaking power generation mode (Fig 1).

The second phase plan initiated in JFY 1976 will result in construction of a 20,000 kWh power plant (Mark VII, VIII) that will provide both output and operating time. Experimental research has been directed at the analysis of problems such as durability of power generating channels, reliability of superconducting magnets, and analysis of power generation systems (heat balance, seed, NO_x, etc.), and data necessary to the design of the next stage pilot plant are being accumulated.

The experimental building to house the Mark VII MHD unit will be completed in JFY 1979. Among the equipment making up the Mark VII, the smoke duct, electric dust precipitator, noise suppressor, smoke stack, and operating instrumentation and control equipment are part of the group that is expected to be manufactured this year. At the same time, materials development and research on electrode phenomena, research on element technology, and research related to power generation systems will be continued.

2) Waste Heat Utilization Technology System

As shown in Fig 2, roughly 50 percent of the total energy consumed in our country is dispersed as waste heat into the atmosphere, rivers and streams, and the seas, and the effective recovery of this waste heat is one of the keys for resolving the energy demand problem in this limited resources and high energy cost age. Our country's metal industries have a very high energy

consumption rate in comparison to other leading countries, with roughly 60 percent of the energy being tied up in this area. As a result, promotion of energy conservation by industry together with the reuse of the heat discharged by local industry or people are considered to be important subjects from the social viewpoint.

The purpose of this project is the development of a system for the efficient recovery of waste heat from various plants and its effective reutilization. Innovative new technology along the lines of various element technology including heat recovery, heat exchange, heat transport, and heat storage will be developed and a system for the integrated use of these technologies will be researched to achieve this end.

It is planned to test the experimental units test produced the previous year and subject them to modification studies during JFY 1979. At the same time, dry quenching of coke and thermal siphons will be subjects for which pilot plant construction is being planned.

3) High Efficiency Gas Turbine

Based on the concept of further promoting energy conservation, this project plans to achieve spectacular increase in thermal efficiency of gas turbines for power generation and utilize the waste heat from the gas turbine to produce high temperature and high pressure steam to be supplied to a steam turbine. It proposes the development of a so-called compound power generation system that will be the central unit with thermal efficiency greater than 55 percent and low pollution effect on the environment. In addition, studies will be conducted on a total energy supply system in which a compound power generation plant and centralized heating and cooling systems will be integrated.

This research and development program was initiated in JFY 1978. The activities during JFY 1979 will include further promotion of the previous year's research and development programs, and efforts will be concentrated on super heat resistant alloys with good balance in various properties such as creep rupture strength, superhigh temperature corrosion resistance, and thermal fatigue strength as well as research and development of heat resistant ceramic materials of superior high temperature strength and high temperature corrosion resistance. In addition, research and development of element technology including items such as turbine blade cooling technology and combustion technology will be conducted together with the overall effect of the heat supplying compound power generation system.

2. Research and Development on Leading and Basic Energy Conservation Technology

Should the project just mentioned be perfected, very great energy conservation effect can be anticipated, but there still will remain a large number of elements that require further research and development. At the same time, research and development activities that are difficult to handle by the

facilities available in private laboratories are being pursued at the experimental laboratories under the jurisdiction of the Agency of Industrial Science and Technology.

Continuing from the previous year, the efforts during JFY 1979 will include 1) superconducting electric power transmission (utilization of very low temperature at which electrical resistance of certain metals is essentially zero in research and development to establish the foundation of super conducting power transmission technology in which transmission losses are essentially zero), 2) new type battery (research and development on large capacity redox flow type battery to store power generated at night), 3) new power sources (research and development on a hybrid powered vehicle utilizing flywheel power), and 4) heat related technology (research to conserve energy from glass melting furnaces, research on low temperature dyeing technology, heat pipes). New projects include research on energy conservation in graphitization, research on energy conservation technology related to infrared irradiation of ceramic materials, and research on heat supply systems utilizing waste heat from plant and animal production processes and waste hot water.

3) Assistance to Private Research and Development on Energy Conservation Technology

This program involves the promotion of independent energy technology development by the private sector through assistance in the form of important technology research and development subsidies for research and development conducted by private industry.

During JFY 1979 assistance is expected to be given to the following programs in continuation of the previous year. 1) Development of manufacture, reaction, and other production processes with improved energy consumption volume and basic units (technology to introduce energy conservation into production processes), 2) development of new equipment with improved energy consumption and basic energy unit mainly for use in the production area (technology to introduce energy conserving equipment), 3) development of energy conserving equipment, new control equipment and heat insulating material to reduce energy losses in processes, and equipment and material to supplement peripheral areas of processes that consume energy (technology on peripheral and supplementary equipment and materials for energy conservation), 4) development of equipment and processes to utilize waste energy that heretofore has not been reused (unutilized energy utilization technology), and 5) competitive development of energy conservation on personal use equipment such as room air conditioners and on solar systems (heating, cooling, and hot water supply using solar energy) are the programs scheduled to be pursued.

The [room air conditioner] of 5) was selected as a household electric appliance for home use that was an energy consuming device and was: a) one that overall used a large quantity of energy, b) one that was expected to become very popular in the future and which was expected to create considerable increase in energy consumption in the near future, and c) one whose period and duration of use would be rather concentrated and which would be expected to create a peak demand.

The room air conditioner is scheduled to be the subject of further study during JFY 1979 in continuation of the previous year.

The [solar systems] of 5) are one in which basic technology objectives are being attained and which are now in the step at which the various problems associated with practical development are being resolved. This is the so-called solar system for which demonstration research and development are being promoted (elucidation of practical problems associated with practicalization, establishment of countermeasures for malfunctions, maintenance, and establishment of methods of maintenance supervision through research and development on a reliable system) to thereby establish a reliable system.

4. Energy Conservation by Standardization

Energy conservation through standardization refers to that practice in which the Japan Industrial Standards (JIS) are specified or modified together with the active display of a JIS mark (㊤) that indicates a given industrial product has a quality and performance that conforms with specifications as far as energy conservation is concerned, providing the consumer with useful information at the time of purchase and thereby promoting energy conservation.

During JFY 1979 these standards will be revised for a) improvement in energy efficiency, b) improvement in handling method, and c) improvement in insulating efficiency standpoints. Special effort will be made to specify and modify those items for which urgent measures are required. At the same time, efforts will be directed at quick shift to the adoption of the JIS mark display system on goods.

In addition, "survey research on standardization of building materials and facilities for energy conservation" will be practiced in order to understand the basic items necessary to promote energy conservation standardization along the lines of building construction. Furthermore, "survey on energy conservation standardization of household appliances" (new JFY 1979 project) is expected to be conducted in order to popularize and promote household appliances with good energy efficiency.

5. Promotion of Joint International Research

Since April of last year Japan has been participating in the IEA (International Energy Authority) energy cascading project (multiple stage utilization) that is being set up and specified as one phase of its participation in international research cooperative efforts. This project proposes energy conservation through the adoption of compound cycle and 3-stage Rankine cycle power generation systems for the multiple utilization of energy in order to realize energy conservation to which joint survey research in the technological and economic feasibilities is being directed. In addition to the above, effort will be directed during JFY 1979 to 1) collecting technical information on three types of improved heat pumps, evaluating them, and setting them up and specifying an improved heat pump system that will describe future aspirations in the area of energy conservation technology and specify the necessary

research and development plans and 2) participating in joint international research and technological information exchange on interchangeability of materials and design and quality control systems of high temperature thermally insulating materials and ceramics for use in energy conservation related equipment such as gas turbine and Sterling engine. These are the areas where participation is being planned.

(Comprehensive R & D Officer, Agency of Industrial Science and Technology)

Outline of Proposed JFY 1979 Budget for the
Moonlight Plan (Unit: million yen)

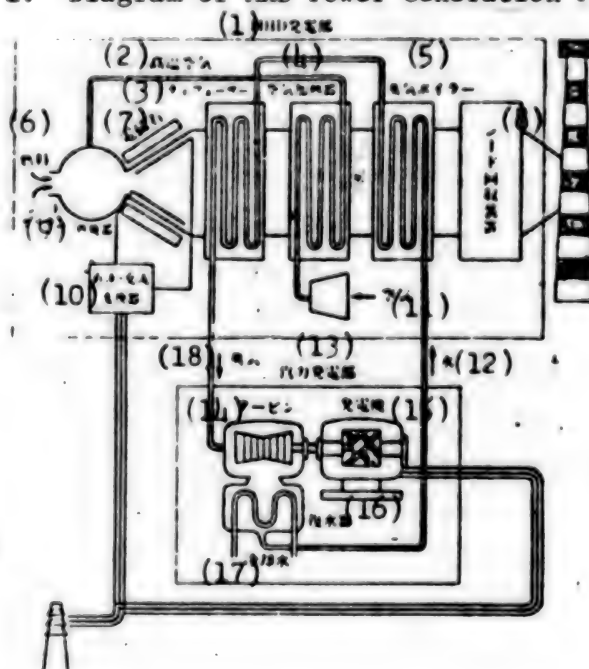
区(1)分	(2)事 項	(3)昭和53年度 予算	(4)昭和54年度 政府原案	(5)昭和54年度の 実施内容
1. 一般会計 (6)	(1)大型省エネルギー技術研究 開発 (7)	1,365	2,131	①高効率ガスタービンの研究開発 (94→399) 耐熱材料(合金、セラミックス)・ガスター ビン要素技術(高圧縮、燃焼技術)の研 究開発及び最適トータルエネルギー系統 システムの研究 ②廃熱利用技術システムの研究開発 (617→793) コークス燃焼炉収容装置の製作、その他の 実験機の試験・改善研究等及びトータル システムの研究 ③電磁流体(MHD)発電の研究開発 (635→914) MHD発電実験機(マークVB)を収容する 実験棟の完成(三菱重工業研究所敷地) (161→375)、マークVBの構成機器(炉道、 電気集じん器等)の製作、材料開発等 素技術の研究、MHD発電システムの研究
	(2)先進的省エネルギー技術研究開発 (11)	114	117	④工業技術院傘下の試験研究所における特許(114→117) 研究 超電導技術、レドックス電池による電力 貯蔵、フライホイール動力車、熱間過程 機(ヒートパイプ、ガラス膨脹計、低蒸 気色加工技術等)
	(3)民間の省エネルギー技術研 究開発の助成 (13)	451	452	⑤民生用機器(ルームエアコン)の省エネルギー 性能の競争開発 ⑥ソーラーシステム(太陽熱暖房給湯技術)(52→52) の実証研究開発 ⑦一般等 (363→337)
	(4)省エネルギー標準化 (17)	37	37	⑧家庭用機器の省エネルギー標準化調査 (0→8) ⑨省エネルギー用建材及び設備等の標準化等 (37→38)
	(5)国際研究協力 (20)	11	11	⑩アドバンスト・ヒートポンプ実施協定への 参加 ⑪エネルギーカスケードニングに関する国際 共同研究の継続
(24)	小計 (23)	1,978	2,771	
2. 特別会計 対策特別会計	高効率ガスタービンNO _x 等 環境技術の確立実証試験等調査 (25)	—	205	高効率ガスタービン環境保全実証調査シ ステム (0→205) 計 (26)
合 計 (27)	計	1,978	2,976	* 事務経費、調査費を含む。 (28)

- Key: 1. classification 2. item 3. JFY 1978 budget
4. draft JFY 1979 budget 5. contents of JFY 1979 budget
6. general account
7. research and development on large scale energy conservation technology
8. research and development on high efficiency gas turbine [heat in-
sulating material (alloys, ceramics) gas turbine element technology
(vane cooling, combustion technology) research and development and
research on optimum total system] (94→399)
9. research and development on waste heat utilization technology system
[construction of equipment to recover sensible heat in coke, testing
and improvement research on other experimental equipment, and research
on total system] (617→793)
10. research and development on magnetohydrodynamic (MHD) power generation
[completion of building to house the experimental MHD power plant

Key to Outline continued

- (Mark VII (on grounds of the Mitsubishi Heavy Industry's Takasago Plant), fabrication of constitutive parts of the Mark VII (smoke ducts, electric dust collector, etc.) research on element technology such as material development, research and MHD power generation system] (635-914)
11. research and development on leading and basic energy conservation technology
 12. special research at laboratories under the jurisdiction of the Agency of Industrial Science and Technology [super electrical conduction technology, power storage in redox type battery, flywheel powered vehicle, heat related technology (heat pump, glass melting furnace, low temperature dyeing technology, etc.)] (114-117)
 13. assisting private research and development on energy conservation technology
 14. equipment for individual use (room air conditioner) competitive development along energy conservation lines (36-63)
 15. demonstration research and development on solar systems (solar heating, cooling, hot water supply technology) (52-52)
 16. general framework, etc. (363-337)
 17. energy conservation standardization
 18. survey on energy conservation standardization of household appliances (0-8)
 19. standardization of materials and equipment for energy conservation use (37-38)
 20. international research cooperation
 21. participation in advanced heat pump development agreement (0-17)
 22. continuation of joint international research on energy cascading (11-7)
 23. subtotal
 24. special account for power sources development promotion policy
 25. survey on reliability demonstration experiments on treatment technology for items such as NO_x generation in high efficiency gas turbines
 26. environment safety demonstration and survey system for high efficiency gas turbine (0-205)
 27. total
 28. includes office and coordination expenses

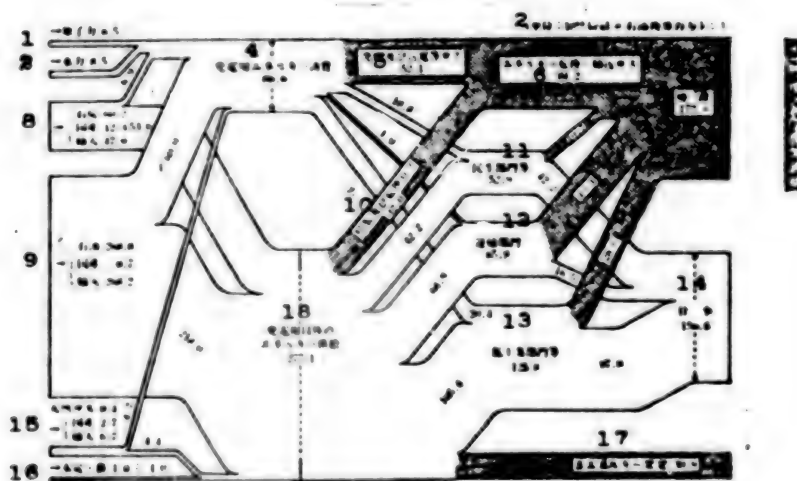
Figure 1. Diagram of MHD Power Generation Plant



Key to Figure 1

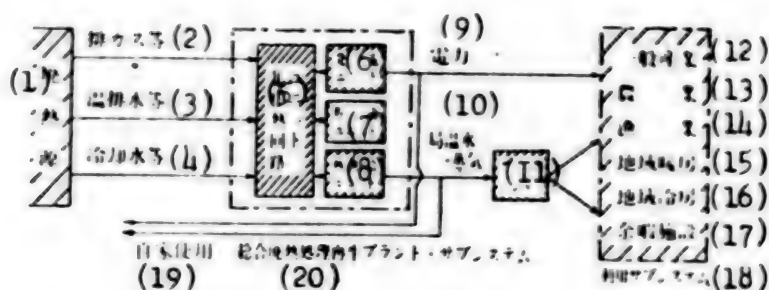
- | | |
|------------------------------------|-----------------------------------|
| 1. MHD power generation section | 2. high temperature air |
| 3. diffuser | 4. air heater |
| 5. steam boiler | 6. fuel |
| 8. seed recovery facility | 7. electromagnet |
| 10. DC-AC converter | 9. seed potassium combustion unit |
| 13. steam power generation section | 11. air |
| 16. condenser | 12. water |
| 18. steam | 14. turbine |
| | 15. generator |
| | 17. coolant water |

Figure 2. Energy Supply Flow Chart for Japan (JFY 1975)



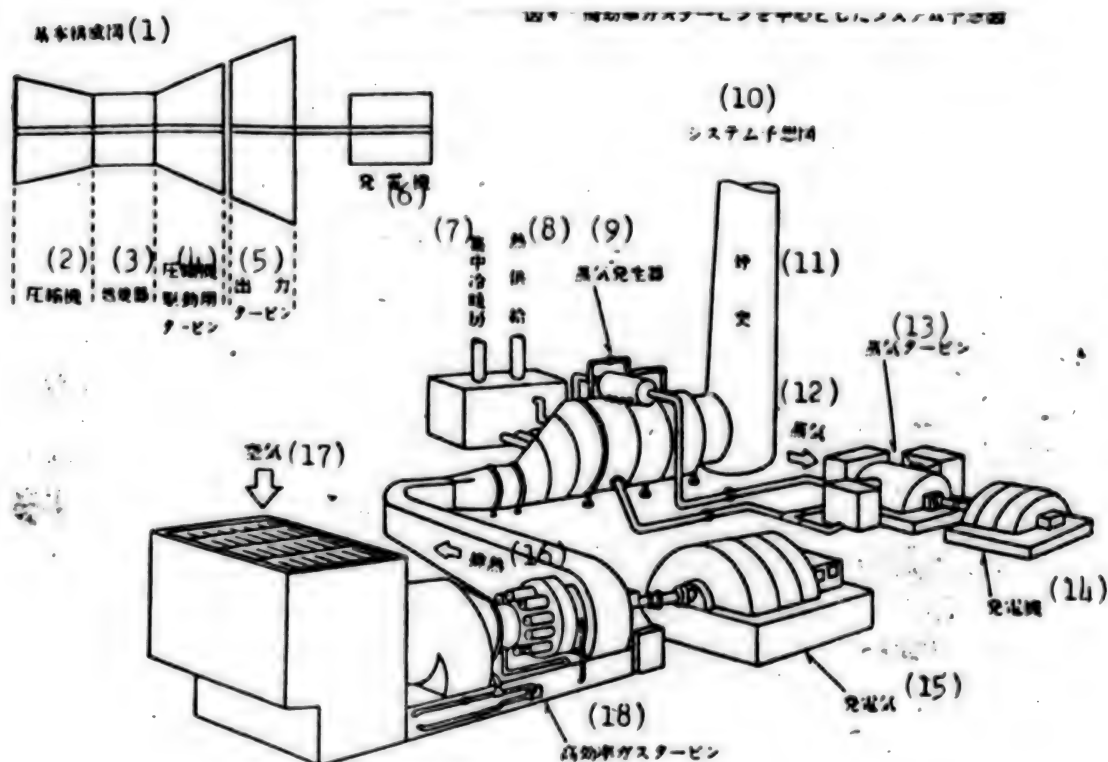
- Key:
- | | |
|---|--|
| 1. nuclear power 6.5 | 2. (unit: 10^{13} kcal = 10^6 tons oil) equivalent |
| 3. hydro power 8.5 | 4. energy consumption for electric power |
| 5. power generation and transmission losses 52.1 | generation 86.6 |
| 6. energy conversion and transport losses 84.2 | |
| 7. discarded 172.3 | |
| 8. coal 60.2 (domestic 12.3, imported 47.9) -53.6 | |
| 9. oil 268.8 (domestic 0.7, imported 268.2) | |
| 10. retiring and conversion losses | 11. daily life sector 52.9 |
| 12. transport sector 65.9 | 13. mining manufacturing sector 125.8 |
| 14. construction | 15. natural gas 9.4 (domestic 2.5, imported 6.7) |
| 16. charcoal, firewood 1.0 | 17. non-energy demand 30.9 |
| 18. energy supply for use other than power generation 277.1 | |

Figure 3. Total System for Waste Heat Utilization Technology



- Key:
- | | |
|------------------------------------|--|
| 1. waste heat sources | 2. waste gas, etc. |
| 3. waste hot water, etc. | 4. coolant water, etc. |
| 5. concentrated heat circuit units | 6. power generation unit |
| 7. storage unit | 8. heat supply unit |
| 9. electric power | 10. local hot water, steam |
| 11. substation | 12. general industry |
| 13. agriculture | 14. fisheries |
| 15. local heating | 16. local cooling |
| 17. leisure facilities | 18. utilization subsystems |
| 19. household use | 20. integrated waste heat treatment and regeneration plant subsystem |

Figure 4. Conceptual Diagram of System Centered on High Efficiency Gas Turbine



Key to Figure 4

- | | |
|------------------------------------|---------------------------------|
| 1. basic structural diagram | 2. compressor |
| 3. combustion unit | 4. turbine for compressor drive |
| 5. power turbine | 6. power generator |
| 7. centralized heating and cooling | 8. heat supply |
| 9. steam generator | 10. system diagram |
| 11. smoke stack | 12. steam |
| 13. steam turbine | 14. power generator |
| 15. power generator | 16. waste heat |
| 17. air | 18. high efficiency gas turbine |

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CSO: 8129/1239

SCIENCE AND TECHNOLOGY

OUTLINE OF SUNSHINE PROJECT PRESENTED

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 18-20

[Article by Sunshine Promotion Headquarters, AIST: "Promotion of Sunshine Program"]

[Text] Outline

The problems of assurance of stable energy supply and environmental preservation are presently intensifying both domestically and internationally and have become important subjects awaiting resolution. The simultaneous resolutions of the problems of energy and environment are very important in Japan which is particularly deficient in energy resources and is one of the top energy consuming countries in this world. "The Sunshine Program" was initiated in July 1974 against such a background and is a comprehensive plan for the development of nonuclear new energy technology development aimed at the simultaneous resolution of the problems of stable energy supply and environmental protection. It is a national project that is being promoted through close cooperation between the government, national research organs, universities, and private sectors.

The objective of the Sunshine Program is the development of new clean energy technology that will take over a substantial fraction of the nation's energy needs by the year 2,000 through a super-long-term program. It is planned to put the results of each step to practical use as quickly as possible.

The Sunshine Program will enter its 6th year in JFY 1979, and a transition from basic research to the developmental stage is under way. To this end the JFY 1979 new energy technology research and development (Sunshine Program) related budget provides 7.06 billion yen from the general account and 4.88 billion yen from special accounts for a total of 11.94 billion yen (47 percent increase over the previous year). In this manner, even greater promotion of the Sunshine Program is under way. In the specific area of plant development, the engineering assignments have been contracted to the Electric Power Development Company, Ltd. which will serve as the central organ in continuation of the previous year's policy. At the same time, there will be international cooperative efforts in information exchange on coal technology and wind power generation along with acceptance of the IEA assignments related to high temperature geothermal rock power generation and the promotion of direct water-additive liquefaction of coal in a joint Japanese-American cooperative effort.

Solar Energy Technology

Solar energy has low energy density and is controlled by meteorological conditions, but despite these disadvantages aspects it has the advantages of displaying no bias in its worldwide distribution and being an endless source of clean energy. If it were possible to utilize this energy effectively, it is felt that a considerable fraction of this country's future energy demands will be assured. This is why the promotion of research and development on the technology to utilize solar energy must be given important priority.

During JFY 1979 research and development will be promoted along the following lines in continuation of last year's efforts: 1) solar heat power generation system, 2) solar energy heating, cooling, and hot water supply systems, and 3) solar photoelectric power generation system.

Continuing from the previous year, solar heat power generation system studies will involve promotion of component development. At the same time, the construction plans for a 1,000 kW thermal power plant drawn up in JFY 1978 will be the basis for partial fabrication of equipment and on-site construction.

Experiments are being outlined on systems for individual homes (new construction and already built) and large buildings in the area of solar heating, cooling, and hot water supply systems. The systems also will be evaluated at the same time.

Operational research will be initiated on systems for high density residential systems. Research on various collector materials will be continued.

Work on the solar photoelectric power generation system will involve studies on methods of evaluating solar batteries. These will be accompanied by development of ribbon crystal technology, thin film crystal technology, and solar battery production technology using compound semiconductors. At the same time, studies will be continued on the overall system combining the solar battery with conversion equipment and the like.

Geothermal Energy Technology

Geothermal energy is associated with essentially no pollution problems. In addition, Japan being a volcanic country is abundantly endowed with great reserves of geothermal energy sources. These all point to geothermal energy as one of the promising energy sources.

Efforts during JFY 1979 will include promotion of cooperative research between Japan and the United States along with research and development on 1) hot water utilizing power generation technology, 2) geothermal energy prospecting and recovery technology, 3) environmental protection, multiple utilization technology, and 4) volcano power generation technology continuing the previous year's activities. The specific details are given below.

Hot water utilization power generation technology will involve disassembly studies on a 1000 kW class binary cycle plant with joint use of steam, and research will be initiated on the construction of a $1-2 \times 10^4$ kW class large type plant. With reference to "research on development of materials for use in geothermal power production," research on corrosion mechanism, corrosion resistance of materials, and on abrasion resistant materials will be continued. In addition, development will be initiated this JFY on a 2-phase rotating expansion machine.

Studies along the lines of "research on hot water systems in geothermal districts," "research on presence of wide and deep geothermal resources," and "survey research on underground reduction mechanism of hot water" will be continued under the heading of prospecting and recovery technology. "Research and development on survey methods for wide area thermal structures" will be initiated in the form of an actual survey of deep layer geothermal resources. At the same time, "development of in-hole instrumentation technology" will see research on fracturing technology being continued. In addition, the subjects of "development of mud and cement mixtures usable in geothermal environment" and "development of high temperature strata drilling technology" will be pursued for the development of materials, drilling equipment, and well related items associated with recovery from geothermal resources.

The area of environmental protection and multiple utilization technology will see studies such as "development of scale growth prevention technology" and "development of hydrogen sulfide removal technology" being continued.

The subjects of "feasibility study on power generating mode using volcanic and high temperature rock heat" and "research related to drilling and fracturing technology for high temperature rock" will be continued in the area of volcanic power generating technology. In addition, this year will see participation in the IEA program on artificial geothermal energy systems implementation agreement.

Coal Gasification and Liquefaction Technology

In order to actively develop and utilize coal that is the form of fossil energy that is most abundant on this earth as far as reserves are concerned, studies will be directed at converting this coal which is a solid fuel into gaseous and liquid fuel, removing materials that are environment polluting sources during this process, and obtaining easily utilizable clean energy with the purpose of resolving the assurance of stable energy supply and the environmental protection problems.

To this end the Sunshine Program has been promoting 1) low calorie gasification technology and 2) high calorie gasification technology since JFY 1974. Research and development on these technologies are expected to be continued in JFY 1979 from the preceding year.

Research and development on low calorie gasification power generation technology will be implemented by operational research using a 5 ton/day gasification plant and construction of a 40 ton/day gasification facility.

High calorie gasification technology studies will be continued along the lines of basic research on high calorie gas production technology, basic research on catalysts for synthesis of methane, and basic research on gasification properties of coal char under pressure. In addition, detailed plans on a 7,000 m³/day class fluidized bed high calorie gasification pilot plant will be continued from the previous year, and partial equipment fabrication will be initiated once the design is completed. At the same time, research will be initiated on a pressurized fluidized gasification mode for starting material of coal and heavy oil mixture and operational conditions for pressurized water-addition fluid gasification mode.

Coal liquefaction technology will be implemented by 1) basic research on liquefaction properties and reaction conditions, and continuation of operational research on a 1 ton/day solvolysis liquefaction plant along with start in the detailed plans for a 40 ton/day plant, 2) basic research on catalyst conditions and reaction conditions continued from the previous year and research on technology to set up the proper facilities will be followed together with the partial design and construction of a 1 ton/day plant in the area of solvent treatment liquefaction technology, and 3) studies on direct liquefaction technology in which basic research on reaction conditions and research on technology to set up the proper facilities will be continued from the previous year and detailed design of a 2.4 ton/day coal treatment capacity direct liquefaction facility will be initiated.

Hydrogen Energy Technology

Hydrogen not only can be used as fuel but its combustion can be regulated in line with the desired application. At the same time, it can be produced from water making it an infinite resource. It is a dust-free and sulfur oxides free clean energy.

As nuclear power and large thermal power type power generation systems that are difficult to adjust for short period rising or falling demand operation increase in number as expected in the future and other time-limited power generating sources such as solar energy and wind energy also become incorporated into the power generation picture, the production of hydrogen will enable the transformation and storage of energy that can then be used as required. The easing of the peak and off-peak power demand and supply situation in this manner is a natural application. In addition, the development of a series of utilization technology such as fuel cells and hydrogen engines will open new areas of utilization beyond simply easing the demand and supply situation.

The activities in JFY 1979 will see added emphasis on researches related to production technology, transport and storage technology, utilization technology, and safety technology as well as 1) completion of a high temperature and high pressure water electrolysis method test plant (4 Nm³/hr), 2) hydrogen electrolysis using a solid electrolyte and by a thermochemical approach other than the high temperature high pressure electrolysis mentioned above, and 3) research on hydrogen transport-storage technology, safety technology, and hydrogen energy system will not only be continued but expanded during JFY 1979.

Comprehensive Research

Solar energy, geothermal energy, coal energy by gasification and liquefaction, and hydrogen energy are the four major themes that are emphasized in the Sunshine Program, but these are not mutually independent but rather mutually related. Furthermore, they will make up part of the total energy system together with present energy forms such as oil and coal and the anticipated nuclear fusion energy in their utilization states. As a result, the development of new energy technology must always take into consideration its place in the total energy system. In addition, there must be introduction of scientific research and development management suitable for the technological development of new long-term and large-scale energy in order to effectively execute the Sunshine Program along with analysis of related materials technology and the grasping of technological trends from patents and similar sources. At the same time, there is need for feasibility studies based on technological surveys and basic experiments in order to seek out seeds of new energy technology with promise in the future.

Research on a total energy system, research on methods of supervising research and development, and research on patents and information survey will be continued from JFY 1978 during JFY 1979 as the supporting research program for promoting the Sunshine Program. In addition, research on ocean temperature differential power generating system and in wind power conversion system will be part of the 11 themes that will be continued along with a new addition in the form of solar energy coming under research on new technology technology seeds.

(Sunshine Program Promotion Headquarters, Agency of Industrial Science and Technology)

JFY 1979 Budget for Sunshine Program Related Themes
(Unit: Million Yen)

昭和54年度 サンシャイン計画関連予算の概要

(単位: 百万円)

	54年度予算案			53年度予算		
	3. 一般会計	4. 特別会計	5. 計	3. 一般会計	4. 特別会計	5. 計
1. 太陽エネルギー	3,768		3,768	2,013		2,013
2. 地熱エネルギー	1,183	2,369	3,552	976	2,209	3,185
3. 石炭エネルギー	395	2,507	2,902	1,023	418	1,441
4. 水素エネルギー	690		690	590		590
5. 総合研究等	1,023		1,023	899		899
5 計	7,059 (うち電免委託分 114,004)	4,876	11,935	5,502 (うち電免委託分 112,312)	2,627	8,129

		53年度 予算	54年度 予算案	12 昭和 54 年度の 実行 内容	
1. 一般会計	3	2,013	3,768	①太陽熱発電プラント(1,000W 2方式、香川県仁尾町)の建設(1,005→2,969) 1	
(1)太 陽	13			②ソーラーハウス(4棟、東京、神奈川、大阪、大分)の運転評価等(480→2880) 1	
(2)地 熱	17	976	1,183	③太陽電池の研究(338→354) 等。 18	
(3)石 炭	22	1,023	395	①地熱熱水利用発電プラント(20,000W)の研究(203→320) 18	
(4)水 素	25	590	690	②地熱探査、採取技術開発(580→593) 19	
(5)総合研究等	29	899	1,023	③環境保全技術開発(79→102) 20	
小 計	34	5,502	7,059	④高温岩体発電(大山発電)の研究(76→95) 等。 21	
2. 電源開発 特別会計	35	2,209	2,369	①石炭ガス化技術の研究(128→120) 23	
3. 石炭-石油 特別会計	39	418	2,507	②石炭液化技術の研究(360→274) 24	
(1)低カロリーガス化	41	418	758	(54年度はプラント開発は石炭・石油特別会計による)	
(2)高カロリーガス化	43	0	934	①高温高压水電解水素製造プラント(4m ³ /時、神奈川県昭和重工)の建設・運転26 (158→245)	
(3)石炭液化	45	0	815	②水素製造技術の研究(223→236) 27	
合 計	49	8,129	11,935	③水素利用技術の研究(114→115) 等。28	
				④総合研究の拡充(新エネルギーシーズ研究に生体系のエネルギー変換研究を追加) (308→345) 30	
				⑤国際協力の拡充(45→60) 31	
				イ) I E A 技術協力分組金の拡充(従来の石炭技術情報及び風力発電に加え、地 熱高温岩体を追加)(34→44) 32	
				ロ) 石炭液化に係る日米協力の推進(日米協力連絡調整等事務費の計上)33 (0→5) 等。	
				①大規模中部地熱発電所環境保全調査(熊本、大分県、豊後地区)の継続 35 (2,208→1,349)	
				②地熱発電所熱水有効利用調査及び地熱環境調査の継続(1,001→1,020) 36	
				5t/日プラントの運転研究及び40t/日プラントの建設(北海道夕張) 42	
				7000m ³ /日プラントの建設(福島県いわき市) 44	
				①ソルボリシス液化方式1t/日プラントの運転研究(長崎県三井物産) (491) 46	
				②溶剤処理液化方式1t/日プラントの建設(茨城県住友金属) (159) 47	
				③直接水蒸気液化方式2.4t/日プラントの設計(千葉県三井造船) (102) 48 (日米協力の対象)	

5の(注)ソーラーハウスについては、この他重要技術研究開発補助金(52→57)、実用化調査委託費(0→66)。

- Key: 1. draft JFY 1979 budget 2. JFY 1978 budget 3. general account
4. special accounts 5. total 6. solar energy
7. geothermal energy 8. coal energy
9. hydrogen energy 10. comprehensive research, etc.
11. (of which, EPDC contracted fraction)
12. contents of JFY 1979 executional program
13. solar
14. solar thermal power generation plant (2 modes of 1,000 W each, at Nio-machi, Kagawa-ken) to be constructed (1,005→2,969)

Key continued

15. solar house (4 types: Tokyo, Kanagawa, Osaka, Oita) operating evaluations (480→288 (Note))
16. research on solar batteries (338-354) etc.
17. geothermal
18. research on power plant using geothermal hot water (20,000 kW class) (203→320)
19. development of geothermal prospecting and recovery technology (580→593)
20. development of environmental safety technology (79→102)
21. research on high temperature rock power generation (76→95) (volcanic power generation)
22. coal
23. research on coal gasification technology (128→120)
24. research on coal liquefaction technology (360→274) (plant development for JFY 1979 will be from Coal and Oil Special Account)
25. hydrogen
26. construction and operation of high temperature high pressure water electrolysis plant to produce hydrogen (4 m³/hr, Kanagawa-ken, by Showa Denko (158→245))
27. research on hydrogen production technology (223→236)
28. research on hydrogen utilization technology (114→115)
29. comprehensive research
30. expansion of comprehensive research (incorporation of research on biological energy conversion to research on seeds for new energy (308→345))
31. expansion of international cooperation (45→60)
32. a) expansion in share of IEA technology cooperation funds (add geothermal high temperature rock to coal technology information and wind power generation of the past) (34→44)
33. Promotion of Japan-United States cooperation on coal liquefaction (Japan-USA cooperation and liaison survey administrative funds)
34. subtotal
35. Electric Power Development Special Account
36. geothermal
37. continuation of large scale deep geothermal power generation plant environmental safety demonstration survey (Kumamoto-Ken, Oita-ken, Toyohi district) (2,208→1,349)
38. continuation of survey on effective utilization of hot water from geothermal power plant (1,001→1,020)
39. Coal and Oil Special Account
40. coal
41. low calorie gasification
42. operational research on 5 t/day plant and construction of 40 t/day plant (Cyubari, Hokkaido)
43. high calorie gasification
44. construction of 7,000 m³/day plant (Iwaki-shi, Fukushima-ken)
45. coal liquefaction
46. operational research on 1 t/day plant using the solvolysis liquefaction mode (Nagasaki-ken, Mitsubishi Heavy Industries) (491)
47. construction of 1 t/day plant using the solvent extraction liquefaction mode (Ibaraki-ken, Sumitomo Metals) (159)
48. design of 2.4 t/day plant using direct water-addition liquefaction mode (Chiba-ken, Mitsui Shipbuilding and Engineering) (102) (object of Japan-USA cooperation)
49. grand total

Key continued

50. (Note) in addition to the above, important technology research and development subsidies (52-52) and contract funds for practicalization survey (0-68) for solar house related studies

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CS0: 8129/1239

SCIENCE AND TECHNOLOGY

LARGE R & D PROJECT BUDGET, OVERVIEW PRESENTED

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 21-24

[Text] Large Project System

Leading technology with need for rapid development for the sake of the national economy, technology whose development requires vast sums of money and long research period that is accompanied by considerable risk in its development and of a scale such that its development by private efforts is nigh impossible, and technology whose promotion requires planned and efficient research and development in the nature of a national project to involve national funding in assembling the capabilities of the national experimental laboratories, industrial world, and academic world are the objectives of this large project system.

The large industrial technology research and development system (usually called large project system) has handled a total of 16 themes to date including those already completed since its inception (JFY 1966) up to the present time (including the two themes of the Moonlight Program designed with research and development on energy conservation as their objectives that were started in JFY 1978). Research and development to date have come up with some noteworthy advances in electronic parts technology such as those on LSI and IC memory, new type high performance battery technology, and sea water desalination facilities practicalization technology. As of September 1978, this program has been responsible for 1,784 domestic industrial property applications and 81 overseas industrial property applications filed in 158 countries.

There are eight continuing themes being promoted during JFY 1979 together with a start on research and development on a new theme, "optical application instrumentation control system." The budget for the above is presented in the table below.

JFY 1979 Large Project Budget
(Unit: Million Yen)

1 事 項	2 53年度予算	3 54年度予算案
大型工業技術研究開発費等 4	13,852	14,814
パターン情報処理システム 5	2,514	2,803
高圧還元ガス利用による直接製鉄 6	2,150	1,533
自動車総合制御技術 7	585	153
重質油を原料とするオレフィンの製造技術 8	2,485	2,441
航空機用ジェットエンジン 9	2,861	3,387
資源再生利用技術システム 10	2,627	880
超高性能レーザー応用複合生産システム 11	385	2,272
海底石油生産システム 12	71	15 1,124 (内石油分1,078)
光応用計測制御システム 13	0	51
調整費・事務費 14	174	170

- Key: 1. item 2. JFY 1978 budget 3. draft JFY 1979 budget
4. large industrial technology research and development funds etc.
 5. pattern information processing system
 6. direct steelmaking using high temperature reducing gas
 7. comprehensive automobile control technology
 8. method of manufacturing olefins from heavy oil
 9. jet engine for aircraft use
 10. resources recycling utilization technology system
 11. compound production system employing super high performance laser
 12. seabed oil production system
 13. optical application instrumentation and control system
 14. coordination, office costs
 15. coal and oil special account

1. Pattern Information Processing System

This project is concerned with the Achilles heel of the present electronic computers--direct input of various types of pattern information such as characters, figures, photos, shapes, and human voice in a manner that they can be recognized and processed, and this project proposes to develop a system with such capability. This project was initiated in JFY 1971, and research on parts and materials has been completed while research on the research-recognition modes of an information processing system using these parts and research on a comprehensive prototype system are under way.

The results obtained during the previous years on information recognition modes are being compiled during JFY 1979 and a comprehensive system prototype with respective character and figure recognition subsystems and a data base machine parallel processor for handling pattern information subsystems will be assembled, these subsystems will be connected by a high speed ring bus system thereby completing the hardware end of the comprehensive system. At the same time, the software for operational evaluation of this comprehensive system will be put together.

2. Direct Steelmaking Utilizing High Temperature Reducing Gas

This project is aimed at the development of a new steelmaking mode through a closed system, resources conservation, and pollution prevention approach using nuclear heat as the process heat source, and research and development has been promoted since JFY 1973.

Continuing from the previous year, operational research on an experimental plant will be conducted in JFY 1979.

1) Research and Development on High Temperature Heat Exchanger

Research and development on high temperature heat exchanger will involve sectional model limited experiments. Design, construction, and operational research on a high temperature heat exchange experimental plant will be continued from the preceding year, and the system will be verified.

2) Research and Development of Superhigh Heat Resistant Alloys

Experimental research on high temperature strength of super heat resistant alloys will involve creep fracture tests in air and creep fracture tests in a helium atmosphere.

3) Research and Development on High Temperature Thermally Insulating Material

Experiments on properties of quartz glass insulating material and alumina-silica fiber insulating materials involving properties such as thermal conductivity will be conducted.

4) Research and Development on Reducing Gas Production

Operational research on a steam reformer and a pitch gasification facility will be continued from the previous year, and the process will be established.

5) Research and Development on Reduced Ironmaking Facility

The conceptual design for a reduced ironmaking facility of a pilot plant system for direct ironmaking will be drawn up.

6) Research and Development on a Total System

Research on designs for a system at the optimum overall system for direct ironmaking and research on technological problems related to various sub-systems will be conducted.

3. Integrated Automobile Control System

This project is aimed at the development of an integrated control system for automobiles utilizing computers to be applied to the resolution of the present

traffic problems being experienced in metropolitan areas. This research and development program was initiated in JFY 1973 and is entering its 7th year in JFY 1979. During this period, determination of the overall concept, development of algorithms and software, production of various equipment, pilot system experiments, and social utilization surveys along with research and development on practicalization have been promoted.

Since JFY 1979 will be the final year for this project, a comprehensive evaluation will be made along with survey research related to an effect analysis of the practical system and disposition of the facilities.

1) Survey Research on Effect Analysis of the Practical System

The following survey research will be conducted on the "integrated automobile control system" to abet the overall evaluation.

- i) Model patterns will be studied on practical systems according to scale and to type for the road networks of the principal cities, and the appropriate systems will be constructed.
- ii) Measurements will be made from the surveys and the analysis of simulations of the improvement effect of traffic flow and economic effect according to these different model patterns.

2) Execution of Comprehensive Project Evaluation

An integrated automobile control system technology subcommittee will be appointed from the evaluation section to evaluate the research and development results on integrated automobile control technology that has been under study for six years, and a comprehensive evaluation will be made.

3) Designation of Know-how, Patents

The report on the results of the final year's research and development will be issued in May 1979, and a number of items related to know-how obtained during operational research on the pilot system will appear in this report. There is an account of the specifications given in JFY 1978 and a second look at the overall program, and every effort will be made to secure technology that can be regarded as national assets.

4) Disposition of Facilities

The research facilities and pilot system facilities acquired during the course of research will be dismantled and disposed of.

4. Method of Producing Olefins from Heavy Oil Starting Material

This project is aimed at assuring stable supply of raw materials for the petro-chemical industry and the effective utilization of high sulfur heavy oil that is difficult to desulfurize and thereby bring about a pollution

prevention effect. It is dedicated to the establishment of an economical method for the preparation of olefins and similar compounds of high added value using high sulfur heavy oil, which is expected to be available in ample supply, as starting material.

Design and construction of a pilot (roughly 120 t/day raw material capacity) following the coke heat medium fluidized bed mode will be conducted with the hope of establishing long term stable operation technology amenable to continuous cracker operation of over 1000 hours before dismantling and thereby establish long term stable operation technology.

This research and development program was initiated in JFY 1975, and basic plans and detailed plans were drawn up by JFY 1977. Acquisition of principal equipment and peripheral equipment including thermolytic reaction tower, coke heating tower, various fractional distillation towers, and tanks as well as acquisition of construction materials were conducted, and the construction of a pilot plant was initiated in July 1977.

The aforementioned 120 t/day pilot plant will be completed by JFY 1979 at the Kashima coastal industrial belt, and this plant will be subjected to test operations (consisting of mechanical runs with water and air system and test operations with actual fluids). At the same time, basic design research for scaling up necessary for a shift to a practical plant and research to enable capacity to handle various types of heavy oil will be promoted parallel to the above research.

5. Jet Engine for Aircraft Use

In the second phase of this project initiated in JFY 1976, emphasis is being placed on performance stability of the engine, improvement in durability, and enhanced reliability while conducting research and development on a 7-ton class thrust high performance fan engine that can be used for frequent take-offs and landings, highly economical in flight, and characterized by low pollution effects resulting from noise and exhaust.

The efforts of the first stage plan from JFY 1971 through 1975 were mainly in the form of research and development of the engine main body, and an engine with 5-ton thrust in ground tests was successfully tested. Greater attention was paid to the establishment of engine reliability and stability, and the second phase was launched. Research presently is under way on a 7-ton thrust high performance fan jet engine development. The flight performance test (simulation of conditions a plane undergoes during flight through ground based tests) that is one of the key points in jet engine development was conducted in November 1977 at the British National Gas Turbine Laboratory, and the test was successfully negotiated giving this research and development program a major boost.

The following research and development will be conducted during JFY 1979.

- 1) Research on reducing noise levels will be conducted on actual plane sound

absorbing structures in basic tests using a flowing field test facility. Research on reduction of toxic exhaust will involve studies on the simultaneous reduction of oxides of nitrogen and other toxic exhaust components and high pressure combustion experiments designed to greatly improve durability.

Research on inlet distortion will involve some cross wind tests designed to improve performance of engine control devices and high pressure cooled turbine blade engine components.

2) A second phase initial test manufacture engine for use in environment resistance performance tests will be test produced. At the same time, basic design on a practical engine in the form of a second phase second test manufacture engine will be completed to enable establishment of targeted performance specification, and detailed design will be initiated.

3) Rapid acceleration-deceleration tests, performance tests such as high temperature operational tests, and 150 hour endurance test, and 50 rounds of low cycle fatigue tests will be conducted on the second phase initial test manufacture engine, and the data will be applied to the second test manufacture engine.

6. Resources Regeneration and Utilization Technology System

This project is aimed at the regeneration and utilization of solid wastes generated in cities through research and development on processing technology system to create resources.

The first stage (1973-1975) research and development to achieve this end was involved with feasibility studies on element technology and development plans for the total system to clarify the technological possibility of a number of element technologies such as separation technology and disassembly technology as well as to display what nature urban solid waste conversion to resources can assume.

The second stage (JFY 1976-1982) will see the selection of two prototypes of material recovery modes based on the results of the first stage, and design, construction, and operational tests on this experimental plant will be pursued. In this manner the next generation trash treatment mode that is a resources regeneration and utilization system will be technologically established. At the same time, attempts will be made at the experimental verification of the social and economic aspects.

Research and development on this second stage will see the integrated coordination of the various subsystems and basic design and detailed design of systems necessary to the construction of a demonstration plant of a 100 t/day scale for treatment of urban solid wastes. City owned land in Yokohama has been borrowed, and plant construction (excluding a portion of the service facilities and dregs treatment and experimental facility) is almost complete.

Research and development on a "energy recovery type process system" involves basic and detailed design of a system necessary for the construction of a

demonstration plant to treat solid urban waste at the rate of 100 t/day as well as comprehensive coordination of the various subsystems. At the same time, enhancement research on a facility for converting urban solid waste into oil and methane gas has been promoted.

The next stage research and development will be conducted in JFY 1979.

1) This research and development will seek to propose a substitute method for the present trash disposal method at a very early stage, and it will be developed along the lines of "material recovery type process system" taking into consideration the country's fiscal situation and its autonomous side. Comprehensive operational research will be conducted on service facilities in continuation of last year's program and the completion of the treatment facility for dregs.

2) With regard to the "energy recovery process system," drying experiments on the starting materials for thermal decomposition used in the pretreatment subsystem and methane fermentation subsystem will be subjects of research, and design research on the associated process system will be conducted.

3) Supporting research for resources regeneration and utilization technology systems such as utilization and detoxification of dregs, optimization of termolytic processes, sorting out of materials with value and detoxification technology of waste water, and research on fluidized thermal decomposition technology and regeneration of pulp that are being conducted at the experimental laboratories will be continued.

4) T.A (technology assessment) and E.A (environmental assessment) on the "material recovery type process system" and the "energy recovery type process system" related evaluation research on resources regeneration and utilization technology systems will be continued.

7. Compound Production System Utilizing Super High Performance Laser

Improved productivity for small-lot production of a diversity of products that accounts for about 70 percent of the total production value in the machine industry is a must if any spectacular future developments are to be made in the machine industry. To this end, this project is aimed at the establishment of the technology necessary to develop a compound [modular] system that offers an integrated system for producing many small volume products along the lines of machine parts from metal starting materials which is flexible and has speed in its production, and research and development was initiated in JFY 1977 to be conducted over a 7-year period.

The compound production system that is the proposed objective of this project will process the simultaneous capability for 10-odd different machine tool operations (cutting technology), plastic forming (shaping technology), and assembly, and the development of a practical system is the goal.

Basic design on the various components and the overall makeup was conducted up to the previous fiscal year, and the following research and development will be conducted in JFY 1979 that is the 3d year of this project.

1) Basic design on the total system developed the previous year will be the basis for research coordination of the various element technologies, and the structure of the target products that can be readily fabricated with this system will be analyzed.

2) Work conducted during the previous year on cutting technology will be continued along the line of basic tests on various properties of mobile units and new compound structural materials along with development of methods of designing basic constitutive units of modular machines and methods of detecting performance degradation in cutting tools. Design and test fabrication of experimental units with compound cutting mechanisms, main shaft, and driving modes that are the principal components will be conducted after which tests will be initiated.

3) In the area of basic mold fabrication technology basic research will be continued from the previous year on assembly of metal molds for odd shape fabrication items and assembly of molds for powder metallurgy items. At the same time, the basic designs of the previous year will be the basis for an extension in forming technology to design and test fabricate major constitutive elements of the experimental facility after which operational experiments will begin.

4) Work on automated assembly technology is involved with test construction of a gas temperature measurement and control device in continuation of the previous year's work accompanied by control experiments. At the same time, basic studies and designs of the previous year will be the basis for design and test fabrication of the principal components of a large output laser oscillator in the form of a 5 kW carbon dioxide gas laser oscillator (biaxial crossing type and triaxial crossing type) and a medium output laser oscillator after which experiments will be undertaken. In addition, design, test fabrication, and experiments on an experimental device for surface finishing of optical parts for laser use will be initiated.

5) Automated diagnostic technology will involve basic experiments on rotational precision in continuation of the previous year's work. At the same time, the test results of the previous year will be utilized in design and test operation followed by operational tests on experimental devices such as malfunction diagnostic device for a cutting system, device for correcting cutting edge positioning, and major parts of automated detection devices.

6) Work on design and control technology will see the connection of input-output devices to the control supervision system developed the previous year followed by simulation of operating experiments. At the same time, the research results of the previous year will be used to test prepare and test a program designed to convert machine parts information to numerical values using the automated design processor.

8. Underseas Oil Production System

This project will involve research and development on a seabed oil production system that can be effectively used at great water depths (depths greater

than 300 m) and which can be applied to the continental shelf surrounding Japan and the slopes of the continent. It is being promoted under a 7-year plan starting in JFY 1978 and extending through JFY 1984. This project is aimed at the stable assurance of oil and natural gas reserves and improvement of overall ocean development technology.

At the present time, recovery of oil and natural gas from offshore sea bottoms is through a platform mode. This mode entails increasingly greater quantities of steel and longer work periods as the water depth increases, and there are technological and economic limits. Even if a very vast oil and natural gas field is involved, the economical production of oil and natural gas from depths greater than 300 m will require a new production mode of the type envisioned in this project.

The conceptual design of the previous year's total system and the basic designs of the subsystems will be the basis for the following research and development during JFY 1979 which is the 2d year of this program.

- 1) Research on overall systems engineering and research on operational technology will be conducted with respect to the total system in which each subsystem is exploited for some specific organic capability. At the same time, an integrated land and sea experimental plan will be established.
- 2) Based on the basic design drawn up the previous year, model experiments will be conducted for each subsystem to collect data necessary to design, and detailed design will be completed on objective data.
- 3) The emphasis of research and development at the Mechanical Engineering Laboratory will be along the following lines.
 - i) Research and development on access control technology to fixed objects in the sea: A 2-dimensional crude direction control system will be developed, and this will be combined with the results from the previous year to essentially complete the crude direction control system. At the same time, development will be initiated on a precise direction control system.
 - ii) Research and development of facilities diagnostic technology for pipelines: Carrying over from last year, scanning type and on-line type pipe damage and leakage diagnostic system design data will be accumulated. Development of processing technology for detection signals will be conducted at the same time.

Optical Application Instrumentation and Control System

This project will involve the use of glass fiber (fibrous glass) in place of the communication cables used in the past on wire communication systems and the use of light (laser beam) in place of electric current. This research and development is aimed at a system that can conduct measurement and control involving large volumes of information under the worse environmental conditions for use within a specific area of an industrial zone or large plant. It will be promoted through an 8-year plan starting in JFY 1979 and ending in JFY 1986.

This plan not only will aid in the resolution of important subjects such as resources conservation of various plants, energy conservation, low pollution, and safe operation but will also be important to the development of the optoelectronics industry that is expected to become the central structure of the future information industry. In addition, the results of this development will be applicable not only to industry but to the development of a broad sector of the social system and will contribute greatly to the people's welfare.

Research and development during JFY 1979 which is the initial year of this project will see the start on basic research on the various subsystems including the instrumentation subsystem, information subsystem, and control subsystem.

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SOPHISTICATED MEDICAL EQUIPMENT R & D PROCEEDING APACE

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 25-26

[Article by Technology Promotion Section, AIST: "Promotion of Medical and Welfare Equipment Technology Research and Development"]

[Text] Research and development is being conducted by the Agency of Industrial Science and Technology on those sophisticated medical equipment requiring post-haste development which involve considerable risk in their research and development as a result of which independent efforts on the part of private industry alone will be difficult. Technological development of equipment has been under way since JFY 1976 through a contract research system in a program aimed at developing a very well-off society. The equipment to be developed all have specified comparatively short developmental periods of 3-5 years and are being developed mainly to conform to requests for improved medical services and lessening the burdens of the aged and physically handicapped through the development of practical, popular equipment. Within this group of equipment are the multiple component automated biochemical analytical facility, automated blood analyzer, modular electric wheel chair, braille reproduction equipment, physical therapy equipment for injured people to aid recovery of their physical functions, and multiple capability bed for severely injured patients that had been developed to the stage of meeting the initial goals during JFY 1978 such that further development will be terminated. In the special case of the modular electric wheel chair, the Ministry of Health and Welfare is going to allocate a budget contribution in JFY 1979. The braille reproduction equipment has evoked some strong sentiments from among concerned people, and the various circles are awaiting the development of equipment with great anticipation.

In the midst of such a background, the Agency of Industrial Science and Technology decided to take up the active development of those equipment for such emphatic requests are coming from society as a national project. The program during JFY 1979 involves continued development on the four types of portable artificial kidney, artificial heart for clinical use, laser scalpel, and implant artificial ear (supersmall hearing aid). In addition, it was decided to initiate development on four new types of equipment including the positron discharge nuclide horizontal cross sectional layer

device (positron CT), kidney functioning aid, walking aid for the blind, and voice enunciation training device for persons with a speech impediment. The development of the laser scalpel and implant type artificial ear was started in the latter half of JFY 1978 has gone past the system design stage and will enter full scale research and development this JFY to enter the second generation stage at last. The budget for JFY 1979 is about the same level as the 860 million yen of the previous year at 870 million yen (includes funds for the Agency of Industrial Science and Technology laboratories experimental costs, the same was true for JFY 1978). The breakdown of research funds allotted to the development of the different instruments is given in the table below. The objectives of the development of these different pieces of equipment are described below.

JFY 1979 Research and Development Funds for Sophisticated Medical Equipment Value in () is JFY 1978 Budget Figure

Unit: 1,000 Yen

(1) 1. 医療機器	585,103(562,090)
(2) (1) 携帯型人工腎臓装置	169,908(139,433)
(3) (2) 臨床用人工心臓装置	136,115(147,094)
(4) (3) レーザーメス	208,138(24,823)
(5) (4) 陽電子放出核種横断断面装置	41,649(0)
(6) (5) 肝臓症補助装置	29,293(0)
(7) 2. 福祉機器	221,835(254,200)
(8) (1) 植込型人工中耳 (超小型補聴器)	183,053(20,528)
(9) (2) 盲人用歩行補助器	29,774(0)
(10) (3) 言語障害者用発声発語訓練装置	9,008(0)
(11) 合計	806,938(806,290)

- Key: 1. medical equipment 2. portable artificial kidney
 3. artificial heart for clinical use 4. laser scalpel
 5. positron discharge nuclide horizontal cross sectional layer device
 6. liver functioning aid 7. welfare equipment
 8. implant artificial ear (supersmall hearing aid)
 9. walking aid for blind
 10. voice enunciation training device for people with speech impediment
 11. total

I. Medical Equipment

1) Portable Type Artificial Kidney

(Development Period: 5 years from JFY 1976)

A small, high performance, and safe portable and self carried artificial kidney will be developed (one in which the patient himself performs the dialysis) for patients of kidney disorder who require artificially aided dialysis to lighten the load of their dialysis therapy. Development of high performance and small dialysis membrane (unit), absorbant (unit), external filter (unit) and pumps will be conducted of a portable type artificial dialysis unit weighing about 10 kg and a self carried type weighing about

1.5 kg (excluding dialysis liquid weight). Special effort will be made during JFY 1979 to complete the portable type followed by clinical evaluation. Experiments will be conducted on animals with the self carried type, after which test production will be started.

2) Artificial Heart for Clinical Use

(Development Period: 4 Years from JFY 1976)

Heart patients belong to the category of being one of the three leading afflictions of aged people in Japan's medical classification, and their number is expected to increase with the passing years to approach the levels of the western countries. This development is intended to produce an artificial heart device for clinical use that will temporarily relieve the functions of a patient's heart following surgery or when it is in a weakened state and thereby aid in its recovery. To this end development will be promoted on drive and control mechanism of high reliability capable of about 3 months clinical use, pump for pumping blood, and high performance polymeric material with great wearing property and compatible with the human body. JFY 1979 will be the final year of this program, and completion of the entire facility and conduction of clinical evaluations are planned.

3) Laser Scalpel

(Development Period: 5 Years from JFY 1978)

A laser scalpel for general surgical applications with the capability of stopping bleeding will be developed for surgery that is accompanied by a great deal of bleeding in order to counteract the need for large volume blood transfusion following massive bleeding, hazard of blood caused infections resulting from transfusions, and the long duration of surgery caused by bleeding. This laser scalpel will consist of the two types of a 100 W CO₂ laser in which the laser beam is directed to the end of the scalpel through a flexible light path and an 80 W YAG laser scalpel in which optical fiber is used to direct light against an internal viewing mirror. Flexible light paths capable of transmitting high output laser beam and optical fiber will be developed along with oscillators for the respective lasers to obtain a total system that also provides safety countermeasures. Research and development will be actively undertaken during JFY 1979 with particular emphasis on test fabrication of the production device for the flexible light path material that will be the kernel of the CO₂ laser.

4) Positron Discharge Nuclide Horizontal Layer Device (Positron CT)

(Development Period: 4 Years from JFY 1979)

The three major diseases of the aged--brain blood vessel damage, cancer, and heart disease--account for more than half of the deaths. Countermeasures against these maladies include early diagnosis. To this end, information over and above knowledge of physiological abnormalities obtained by x-ray CT to

diagnose metabolic disorders will be very helpful. This is why a positron CT is being developed with superior resolving power and detection sensitivity by a technique in which a positron emitting nuclide is used to detect abnormalities in metabolic functions of different organs even before the stage physiological abnormalities appear. High performance scintillation crystals, high quantum efficiency conversion elements, new scandel modes, functional photography, and super speed data processing units will come under research and development. At the same time, development of this device will be promoted as a joint effort with the National Institute of radiological Sciences of the Agency of Science and Technology.

5) Liver Functional Aid Device

(Development Period: 5 Years from JFY 1979)

As the eating habits of the Japanese approach those of the western world, the number of liver patients is increasing rapidly, and the death rate from acute hepatitis is at a very high rate of 90 percent. Despite this situation, only one method is presently available for removal of toxic components from the blood of acute liver disorder patients. In order to counter this situation and effect awakening from hepatic coma, assist liver functioning of liver disorder patients, and improve the life expectancy of liver patients, a liver function aid that not only removes toxic elements from the liver but also aids in metabolic functions is being developed. Research and development on detoxification devices, metabolic aid devices, coordinating devices, and body information measurement and observation devices are under way.

II. Welfare Equipment

6) Implant Type Artificial Inner Ear (Super Small Hearing Aid)

(Development Period: 4 Years from JFY 1978)

Development will be directed at a small and high reliability implant artificial middle ear to supplement partial hearing capability to hearing impediment patients including children with hearing difficulties and resolve some of the problems that beset the installation of the present hearing aids. To this end, super small, high reliability, and high performance microphones, semiconductor elements, power supplies, audio processors, safety device, driving transistors with low energy consumption, and housing material that is moisture resistant and unreactive to body components are under research and development.

7) Walking Aid for Blind

(Development Period: 3 Years from JFY 1979)

Small, high performance, and low cost walking aids will be developed to reduce the risks faced by the blind when venturing outdoors, promote their participation in social functions, supplement a blind person's capabilities in addition

to the use of a white cane, and indicate obstructions within a 5 m distance in the forward direction will be developed. Ultrasonics or light will be used to detect obstructions through a small and high performance receiver-transmitter unit or an optical detector which will pass through the blind's hearing or touch sense to transmit the necessary information in the display device that will be developed. A simulator for hearing disability diagnosis to determine the optimum hearing display according to the type of blindness will be developed.

9) Pronunciation Training Device for People with Speech Impediments

(Development Period: 4 Years from JFY 1979)

A pronunciation training device will be developed to promote pronunciation training of people with speech impediments, display electrically the state of the sound making organs such as the tongue of the patient, allow the patient to visually see his speech characteristics, and enable him to conduct comprehensive pronunciation training by himself. A tongue position detection sensor, voice pitch intensity, nasal sounds, nonnasal sounds, and vocal and nonvocal sounds type voice characteristics will come under research and development. At the same time, a training program also will be developed along with a portable training device to enable training to be conducted very simply at home.

(Technology Promotion Section, Agency of Industrial Science and Technology)

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JFY 1979 BUDGET FOR MOVE TO TSUKUBA PRESENTED

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 p 27

[Article by Planning Section, AIST: "Tsukuba Research Center"]

[Text] In December 1971 the Ministry of International Trade and Industry decided to move the nine experimental laboratories under its jurisdiction located around the capital as well as a portion of this Agency to the Tsukuba Research and Academic City to create a research center of international competitive level in the area of industrial technology.

Furthermore, a decision was made at the cabinet level meeting of 14 March 1978 on the rough organization of the facilities of the Ministry of International Trade and Industry related organs and the move to Tsukuba will take place during JFY 1979.

The following is the construction situation.

- 1) Research Main Buildings: Construction was initiated in JFY 1974, nine research buildings for the different laboratories were completed by the end of JFY 1978, and plans are under way for their takeover.
- 2) Construction was started on 38 buildings in JFY 1977, 45 buildings in JFY 1978, and six will be started in JFY 1979. A total of 30 buildings was completed in JFY 1978 while 53 are expected to be completed in JFY 1979 and six in JFY 1980.
- 3) Joint Utilization Facilities: Construction of the central main building was initiated in JFY 1975 and completed by the end of JFY 1977 and ceded over. Construction was started on the health facilities in JFY 1977 with expected completion by the end of JFY 1978. Work on the joint use auditoriums, gymnasiums, service centers, and associated resident facilities was started in JFY 1978 and expected to be completed during JFY 1979. Construction on the Information Center for Industrial technology material was initiated in JFY 1979 and is expected to be completed during JFY 1980.
- 4) Environmental Facilities: The special high voltage transformer facility and the energy center were started in JFY 1974 and expected to be completed

in JFY 1978. Joint use auditoriums, heating and cooling facilities, tap water and sewer facilities, city gas facilities, waste water treatment facility, and inplant roadway network construction was started in JFY 1973 and is expected to be completed during JFY 1979. Work on the disaster observation facility was started in JFY 1978 and is expected to be completed during JFY 1979. Work on the athletic facility and the very low temperature supply facility was initiated during JFY 1979 and planned for completion during JFY 1980.

Work on the Second Research Center is expected to begin in JFY 1979.

The JFY 1979 budget for the construction of the Tsukuba Center is 29.8 billion yen representing a decrease of 16.6 billion yen from the previous year's budget of 46.3 billion, and a limit of 5.5 billion has been set on the future-year obligational authority.

The construction costs for the Tsukuba Research Center were 2.4 billion yen in JFY 1973, 3.9 billion in JFY 1974, 19.5 billion in JFY 1975, 26.2 billion in JFY 1976, 33.7 billion in JFY 1977, and 46.3 billion in JFY 1978.

The costs related to this shift to Tsukuba are listed in the following table.

(Planning Section, Agency of Industrial Science and Technology)

Summary Table on Costs Relating to Move to Tsukuba
(Unit: 1,000 Yen)

1 事 項		昭和54年度予算案	備 考
(工業技術院計上)	08移転費 5	5,450,515	19
	09試験研究設備等整備費 6	7,830,798	研究費 7,749,510
	(維持管理費) ←	2,743,487	12設備費 81,288
	(本費分) ←	1,894,940	20
	05非常勤職員手当 8	22,240	
	06職員旅費 9	2,862	
	09試験研究施設等運営費 10	1,862,550	
	09電子計算機等燃料 11	7,200	
	09自動車等運賃 12	88	
	(試験等分)	848,547	
	09職員旅費 13	9,052	
	09手 賃 14	64,090	
	光熱水料 15	64,090	
	09試験研究施設等運営費 16	775,405	
合 計		18 16,024,800	
(通達本費計上) 退職金及び社任旅費 21		1,071,595	
総 計 22		17,096,395	

Key: 1. item 2. draft JFY 1979 budget 3. remarks
4. charged to the Agency of Industrial Science and Technology
5. 09 moving costs

Key continued

6. 09 maintenance costs of 09 experimental laboratory facilities
7. costs for maintenance supervision
8. costs to Agency proper
9. 05 allowance for temporary duty
10. 08 worker's travel expenses
11. 09 costs for operating agency such as for Tsukuba Research facility
12. 09 electronic computer rental
13. automobile weight tax
14. (laboratory's portion)
15. employees travel costs
16. 09 agency expenses
17. 09 light, heating, and water
18. total
19. research equipment and supplies
20. general equipment and supplies
21. charged to Ministry of International Trade and Industry proper retirement fund and moving expenses
22. Grand Total

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OUTLINE OF 'IMPORTANT R & D' TOPICS GIVEN

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 28-29

[Article by Technology Promotion Section, AIST: "Budget for Important R & D Subsidies, Outline of Main Technology Measures"]

[Text] The JFY 1979 important technology research and development subsidies assignments include important technology research and development subjects that will be the basis for promoting conversion of Japan's industrial structure to a knowledge-intensive form (Table 1), housing system technology research and development subjects (Table 2), environmental protection and safety measures technology research and development subjects that require quick resolution (Table 3), and energy conservation technology research and development subjects (Table 4). At the same time, it is expected that assignments also will be made to virgin and innovative research and development subjects related to virgin and innovative technology research and development of leading nature and with large spin-off effect to support next generation's technological innovations.

The research and development subjects are listed in the service request outline issued on 26 January, and these are shown in Tables 1-4. It is planned to collect the requests coming under these categories between 1 February to the end of February. On the other hand, considerable revision of subjects is anticipated in the area of the virgin and innovative framework as a result of which the announcement of subjects will be 12 March and the cutoff date for collecting requests will be 11 April. This represents a delay of roughly 40 days beyond the time schedule for items other than virgin and innovative subjects.

The principal turning point in the virgin and innovative framework came with the end of the wood substitute material technology that was conducted for 5 years starting in JFY 1974 in which a measure of success was achieved. During this time of development, it was possible to avoid the incidence of an urgent situation resulting from the disappearance of wood resources because of changes in social and economic situations. Further, the price of oil that is a raw material for the production of synthetic organic wood technology which is one of the effective technologies in wood substitute technology area began to rise considerably. This development was terminated, and new materials

technology will be discussed along the lines of extreme state material technology, living body compatible material technology, composite material technology, and base material technology at the session of the New Materials Subsection, Technological Development Section, Industrial Technology Council on 19 February, and it is expected that leading materials development will be taken up as subject for discussion from within this field.

The total value of this JFY 1979 budget is 3,226,925,000 yen which is an 0.5 percent decrease from the previous year's 3,242,020,000 yen. Pinpointing these changes by content, the items coming under the important technology research and development subjects and housing system technology research and development decreased, environmental protection and safety measures technology research and development and energy conservation technology research and development subjects leveled off, and virgin and innovative technology research and development subjects showed an increase.

The ratio of these research and development subsidies to private industry's total research and development outlay has dropped down close to the 0.1 percent level during the most recent years. There is need to give emphasis to the application of subsidies to those areas in which independent research and development efforts on the part of private industry are very difficult. It is anticipated that there will be a trend in the future to grant these subsidies in leading technological areas where the risk is high and the period of recovery of the initial investment is very long.

At the same time, the subsidy rate is one-half (three-fourths for a fraction of environmental protection and safety technology), and these subsidies are granted for hardware such as construction, buildings, machine facilities, machine tool facilities, materials, and parts (direct manpower costs are also included in virgin and innovative technology development), and this represents no change from the previous year.

Proposed JFY 1979 Government Budget for Subsidies to
Important Technology Research and Development

Values in () are JFY 1978 Budget Items Unit: 1,000 Yen

12 中核技術等	1,942,199(1,957,294)
2 重要技術 中核技術	1,151,200(1,171,200)
3 重要技術	432,000(432,200)
4 住宅システム技術	87,540(97,540)
5 太陽革新技術	271,459(256,554)
26 環境保全・安全対策技術	833,233(833,233)
37 省エネルギー技術	451,493(451,493)
8 一般省エネルギー技術	336,293(363,493)
9 ソーラーシステム実証研究	52,200(52,200)
10 民生用機器省エネルギー技術製品化試作	63,000(35,800)
11 合 計	3,226,925(3,242,020)

Key: 1. key technology, etc. 2. important technology, key technology
3. important technology 4. housing system technology

Key continued:

5. virgin and innovative technology
6. environmental protection and safety measures technology
7. energy conservation technology
8. general energy conservation technology
9. solar system demonstration research
10. test production of parts for energy conservation technology of equipment for private use
11. total

Table 1. Research and Development Subjects under Important Technology

- | | |
|----|-------------------------------------|
| A | I. 国民ニーズ関連技術 |
| 1 | 1. 都市開発、住環境関連技術 |
| 2 | 2. 交通、物流関連技術 |
| 3 | 3. 教育機器関連技術 |
| 4 | 4. 医療福祉機器技術 |
| 5 | 5. 食糧関連技術 |
| 6 | 6. 余暇関連技術 |
| B | II. 先端産業技術及び産業活動高度化技術 |
| 7 | 1. 新材料の開発及び新製造プロセスの開発 |
| 8 | 2. ファインケミカルの開発等新化学製品製造技術 |
| 9 | 3. 自動化技術及び高性能機械の開発 |
| 10 | 4. 電子素子及びその応用装置等電子技術 |
| 11 | 5. 情報処理機器技術 |
| 12 | 6. 航空機関連技術 |
| 13 | 7. 海洋開発技術 |
| 14 | 8. 微生物利用技術 |
| 15 | 9. 繊維産業高度化技術 |
| C | III. 資源エネルギー技術 |
| 16 | 1. 資源技術（省資源技術を含む） |
| 17 | 2. エネルギー技術（表4に掲げる省エネルギー技術研究開発課題を除く） |

- Key:
- A. technology related to people's needs
 1. urban development, living environment technology
 2. traffic, distribution technology
 3. educational equipment technology
 4. sophisticated medical equipment technology
 5. food technology
 6. leisure technology
 - B. vanguard industrial technology, and technology to enhance production activity
 7. development of new materials and development of new production processes
 8. new chemicals production technology such as development of fine chemicals
 9. automation technology and development of high performance machinery

Key to Table 1 continued:

10. electronic technology such as electronic elements and their application
11. information processing equipment technology
12. aircraft related technology
13. ocean development technology
14. microorganisms utilization technology
15. textile industry enhancement technology
- C. resources and energy technology
16. resources technology (includes resources conservation technology)
17. energy technology (excluding energy conservation technology research and development subjects listed in Table 4)

Table 2. Housing System Technology Research and Development Subjects

I. 次に掲げる要件の1を満足する住宅システムの研究開発 1
1. 大規模な工業生産化又は現場施工機械化可能となるもの 2
2. 省資源化に資し、火災等に対し安全な新材料を使用したもの 3
3. 熱、音等に関する性能の改良により居住性を大幅に向上させたもの 4
II. 次に掲げる要件の1を満足する住宅用設備システムの研究開発 5
1. 省エネルギー化及び非公害化に資するもの 6
2. 熱制御の合理化等により居住性の大幅な向上を可能とするもの 7
3. 居住条件の変化に応じて弾力的に変更でき間仕切り等と一体化したもの 8
4. こみ、廃水等に関し、効率的な処理を行うもの 9
III. 住居の現場施工工法、工場生産の合理化のための設備機器の研究開発 10

- Key:
1. (I) research and development on housing systems satisfying one of the conditions given below
 2. (1) one that enables large level of industrial production or cutting short presently used plant process
 3. (2) one contributing to energy conservation and using new materials that are safe in the event of fire or other disasters
 4. (3) one that greatly contributes to liveability by improved performance against heat, sound etc.
 5. (II) research and development on housing facility systems satisfying one of the following conditions
 6. (1) one that brings about energy conservation and is nonpolluting
 7. (2) one that enables great improvement in liveability by rationalizing heat control
 8. (3) one that responds in flexible manner to living conditions and is part of a space partitioned system
 9. (4) one that provides efficient treatment of trash and waste water
 10. (III) research and development on facilities and equipment to rationalize on-site fabrication projects and factory production of homes

Table 3. Environmental Protection and Safety Measures
Research and Development Subjects

11.	一般環境保全対策技術研究開発課題
21.	大気汚染防止技術
3(1)	いおう酸化物処理技術
4(2)	窒素酸化物処理技術(IIの1に掲げる固定燃焼装置に係る脱硝技術を除く。)
5	(3) 上記以外の有害物質の処理技術
6	2. 水質汚濁防止技術
7	(1) SS, COD, BOD, 窒素化合物, りん化合物, 油分等の処理技術
8	(2) 脱色技術
9	(3) 排水の再利用技術
10	3. 廃棄物処理技術
11	(1) 産業系廃棄物処理技術
12	(2) 生活系廃棄物処理技術
13	4. 騒音防止技術
14	5. 騒音, 振動防止技術
15	6. 海洋汚濁防止技術
16	7. 環境保全に係わる管理計画技術
17	8. 環境修復, 改善技術
18	9. クローズドプロセス技術
19	II. 特定環境保全, 安全対策技術研究開発課題
20	1. 窒素酸化物対策技術
21	次に掲げる固定設備から発生する窒素酸化物の除去技術
22	(1) ボイラー
23	(2) 加熱炉
24	(3) 焼結炉
25	(4) セメント焼成炉
26	(5) ガラス熔融炉
27	(6) 硝酸製造設備
28	(7) 上記以外の設備であって窒素酸化物の発生が特に問題となるもの
29	2. 重金属等有害物質処理技術
30	3. 安全対策技術
31	産業災害, 都市災害, 地震災害等の災害防止に係わる技術
32	4. 排煙脱硫石こう対策技術
33	排煙脱硫石こうの利用関連技術

- Key:
1. general environmental protection and safety measures technology research and development subjects
 2. atmospheric pollution prevention technology
 3. sulfur oxides treatment technology
 4. oxides of nitrogen treatment technology (excluding desulfurization technology of fixed combustion facilities listed in II-1)
 5. treatment technology of toxic materials other than those listed above
 6. water pollution prevention technology

Key to Table 3 continued:

7. treatment technology for SS, COD, BOD, oxides of nitrogen, phosphates, and oil
8. decolorization technology
9. waste water reutilization technology
10. wastes treatment technology
11. industrial waste treatment technology
12. living systems waste treatment technology
13. bad odor treatment technology
14. noise, vibration treatment technology
15. ocean pollution prevention technology
16. control measurement technology related to environmental protection
17. environment recovery and improvement technology
18. closed process technology
19. specific environmental protection and safety countermeasures technology research and development subjects
20. oxides of nitrogen countermeasures technology
21. oxides of nitrogen removal technology from the following fixed facilities
22. boilers
23. heating furnaces
24. sintering furnaces
25. cement calcination furnaces
26. glass melting furnaces
27. nitric acid production facility
28. facilities other than the above whose generation of oxides of nitrogen presents problems
29. treatment technology of toxic materials such as heavy metals
30. safety countermeasures technology
31. technology related to disaster prevention in time of industrial disaster, urban disaster, or earthquake disaster
32. countermeasure technology for removing sulfur as gypsum from smoke
33. technology related to utilization of gypsum from smoke desulfurization

Table 4. Energy Conservation Technology Research and Development Subjects

1. 生産プロセスの省エネルギー化技術
エネルギーの消費量、原単位の改善を図る新しい製造、反応等の生産プロセスの開発
2. エネルギー消費機器の省エネルギー化技術
主として産業等に利用される機器のエネルギー消費量、原単位の改善を図る新しい機器の開発
3. 省エネルギー用周辺補助機器、材料技術
エネルギー消費機器、プロセス等のエネルギー損失の減少を図る新しい制御器、断熱材料等、エネルギー消費機器プロセスの周辺でこれを補助する機器、材料の開発
4. 未利用エネルギーの利用技術
廃エネルギー等従来未利用のエネルギーを活用する機器、プロセスの開発

Key: 1. Energy conservation for production processes

Development of production process using new processes, reactions, etc. to reduce the amount of energy used and improve the basic units

Key to Table 4 continued:

2. Energy conservation technology through energy conserving equipment

Development of new equipment designed to reduce the amount of energy used and improve the base units mainly for equipment used in production

3. Peripheral auxiliary equipment and material technology for energy conservation

Development of equipment and material to be used at the periphery of processes using new control equipment, insulating materials, and energy conserving equipment designed to reduce energy losses in energy consuming equipment and processes

4. Utilization technology of unused energy

Development of equipment and processes for making use of previously unused energy such as waste energy

(Technology Promotion Section, Agency of Industrial Science and Technology)

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CSO: 8129/1239

SCIENCE AND TECHNOLOGY

INDUSTRIAL STANDARDIZATION PROGRAM PRESENTED

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 30-31

[Article by Standards Section, AIST: "Strengthening Industrial Standardization Administration"]

[Text] JFY 1979 is the sixth year of the "Industrial Standardization Long Term Promotion Plan," and the four important subjects involved in this plan are listed below.

1) Matters necessary to improve the quality of the people's living, 2) matters necessary to insure good social environment and natural environment, 3) matters necessary for enhancing the development power of industry and nurture its developmental base, and 4) matters necessary to assure a safe and pleasant working environment will be focal subjects on which JIS standards and modifications will be promoted.

Those items for JIS standards that specifically require survey research will be pursued along the following 10 themes in continuation of JFY 1979:

1) survey research for standardization related to the safety of construction materials, 2) survey research for standardizing housing performance, 3) survey research related to weather resistance of durable goods, 4) survey research on standardization related to safety of machinery, 5) survey research on standardization related to performance of high strength bolts, 6) survey research on standardization of distribution machinery and equipment, 7) survey research on standardization of plant equipment, 8) survey research on promoting standardization of welfare-related equipment, 9) survey research related to life evaluation of electrical equipment for household use, and 10) survey research related to standardization of measuring environmental radioactivity.

In addition, reliability tests will be conducted and experimental methods will be standardized in order to insure the reliability of electronic parts, and reliability data in the hands of public and private organs will be collected and analyzed and be prepared for effective utilization.

Maintenance Supervision by the Japan Industrial Standards

The "Japan Industrial Standards" is the organ under the jurisdiction of the Ministry of International Trade and Industry that was established according to the industrial standardization law. Any JIS specification or modification always has to go through the deliberations of this investigative body. This body will conduct general meetings, standardization conferences, various sectional meetings, and special committee meetings during JFY 1979. At the same time, rationalization of committee supervision will be promoted through the utilization of electronic computers.

Popularization of Specifications, Establishment of JIS Mark Display and Certification System

The JIS specification system will be made common knowledge, the JIS mark display on products emphasizing consumer protection will be adopted, and the JIS mark display system will be popularized. Technological direction will be supplied medium and small industries to achieve this end, and the production of goods bearing the JIS mark will be promoted. In addition, on-the-spot inspections will be conducted in continuation of last year in order to reinforce guidance supervision of plants already producing products displaying the JIS mark in order to insure reliability of the JIS mark. At the same time, Japan will actively participate in the activities of the certification supervision committee and the supervisory survey coordination committee that function under the "electronic parts quality certification system" specified by the IEC. Examinations will be continued from last year on concrete blocks displaying the JIS mark since JFY 1976 to be used in civil engineering construction projects.

In addition, JIS summaries will be compiled in continuation of last year for the purpose of improving utilization of specifications and aiding specification information exchanges on an international scale. On-site inspections will be conducted in continuation of last year's practice on ready mix concrete and cement products as countermeasure for the social problem of inadequate control of production that gives rise to situations such as defective concrete. In addition, on-site inspections of retread tires will be newly established.

Promotion of International Standardization

Accompanying Japan's rapid economic development on an international scale is the increasing importance in the relationships between domestic and overseas standards. There is need in the expanded activities in Japan's future trade and overseas investments to promote these specifications and certifications system to an international level.

At the present time, the construction of a code (agreement) related to standards so that the specifications do not become technological barriers to expansion in trade is in the mill in the provisions of GATT (general agreement on duties and trade). When this code applies, the member country will bear the obligation to 1) coordinate domestic and international standards, 2) make no

distinction between domestic and foreign items in the certification system, 3) promote international information exchange so that standards can be compared, and 4) promote technological aid in the area of standardization to developing countries. The enforcement of this code is a desirable act for Japan, Japan has reinforced its coordination with ISO and IEC (international electrical standardization conference), and every effort is being made to strengthen the ties of JIS with ISO and IEC. In addition, the necessary preparations including legal modifications are being made to expand the JIS mark system to foreign areas.

There will be active participation in the operations for developing ISO-NET that ISO is promoting in the cause of information exchange of standards information. It is planned to initiate development in JFY 1979 in the use of EDPS (electronic data processing system) to this end.

In the area of aid to developing countries there will be expanded activities in the education of trainees along with promotions along the line of dispatching specialists and submitting technological information.

Standardization of Energy Conservation

Industrial standardization will be promoted as one phase of the Moonlight Plan (energy conservation technology development system) that was established by the Agency of Industrial Science and Technology in JFY 1978 as a system for the comprehensive research and development on energy conservation technology. Provisions of industrial energy conservation specifications and survey research on standardization of energy conserving building supplies and facilities will be conducted in continuation of last year's program. In addition, survey research will be newly conducted on standardization of energy conservation of household appliances.

Others

Taking into consideration clothing sizes and the body measurements of the Japanese people, physical stature surveys to enable the establishment of dimensional standards for ready-made clothes will be conducted in continuation of last year.

(Standards Section, Agency of Industrial Science and Technology)

Outline of JFY 1979 Industrial Standardization Related Budget

(Unit: 1,000 yen, value in () is JFY 1978 budget)

1 (1)	工業標準化法の施行事に必要な経費	560,658 (528,100)
2 1	工業標準化基盤整備の強化	290,299 (281,922)
3 (1)	信頼性技術開発企画員謝金	532 (514)
4 (2)	信頼性技術開発調査旅費	147 (154)
5 (3)	信頼性データ収集交換費	1,575 (1,572)
6 (4)	工業標準原案作成等調査等委託費	45,688 (44,615)
7 (5)	工業標準化調査研究委託費(10テーマ)	224,179 (216,889)
8 (6)	信頼性技術開発調査委託費	17,103 (17,103)
9 (7)	信頼性採取部品試験委託費	1,075 (1,075)
10 2	日本工業標準調査会の運営	158,498 (158,288)
11 11)	日本工業標準調査会の維持管理	140,277 (140,067)
12 2)	国際会議出席及び開催	18,221 (18,221)
13 3)	規格の普及, JIS マーク表示及び認証制度の促進	74,161 (69,748)
14 4 (1)	規格の普及, JIS マーク表示及び認証の実施	46,844 (46,775)
15 5 (2)	工業標準化のための技術指導	3,445 (3,429)
16 6 (3)	特定品目指定商品(コンクリート構造物)の普及実施	14,159 (13,922)
17 7 (4)	特定商品(生コン及びコンクリート製品, 更生タイヤ)の実施	9,713 (5,622)
18 84	既成衣料の寸法基準作成調査	21,886 (7,633)
19 95	国際標準化事業の推進	15,814 (10,509)
20 0 (1)	省エネルギー標準化	46,292 (37,323)
21 1 (1)	省エネルギー標準化調査対策	2,068 (2,054)
22 2 (2)	省エネルギー-用建材及び設備等の標準化調査研究	35,596 (35,269)
23 3 (3)	家庭用機器の省エネルギー標準化調査	8,628 (0)

Key to Outline

1. funds necessary to implementation of Industrial Standardization Act
2. reinforcing provisions for industrial standardization foundation
3. gratuity to reliable technology developments planners
4. travel expenses for reliable technology developmental planners
5. expenses for collecting reliability data
6. costs of contracted surveys on basic construction of industrial standards
7. contract costs for industrial standardization survey researches (10 themes)
8. contract costs for reliable technology development surveys
9. contract costs for testing of items selected for reliability study
10. operation of Japan Industrial Standards Survey Group
11. maintenance and control by Japan Industrial Standards Survey Group
12. participation and sponsorship of international conferences
13. popularization of specifications, promotion of JIS mark display and recognition system
14. popularization of specifications, implementation of JIS mark display and recognition
15. technology guidance for industrial standardization
16. inspection of specific index products (concrete blocks)
17. implementation of specific products (raw concrete and concrete products, retread tires)

Key to Outline continued:

18. dimensional standards establishing surveys on ready-made clothing
19. promotion of international standardization activities
20. energy conservation standardization
21. energy conservation standardization promotional policy
22. standardization survey research on materials and facilities for energy conservation
23. standardization survey on energy conservation of household appliances

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SCIENCE AND TECHNOLOGY

BUDGET FOR INTERNATIONAL COOPERATION PRESENTED

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 31-32

[Article by Office of the International Research Cooperation Officer, AIST:
"Promotion of International Research Cooperation"]

[Text] The Agency of Industrial Science and Technology is engaging in various international cooperative activities in the industrial area in order to promote Japan's research and development, promote science and technology that will serve as the foundation for economic development of developing countries, and promote international cooperation in the research area.

The JFY 1979 international industrial technology research activities directed at developing countries will spend 163,483,000 yen for the following programs.

1) Special Research

This is joint research involving research considered necessary to the developing country conducted with participation of on-site research personnel at that country and at the research organs of the Agency of Industrial Science and Technology. In addition to the 11 continuing projects including "raw materials for the ceramic industry," the projects "arid region mineral beds," "absorption of spilled oil," and "oxygen fixation" will be newly started.

2) Transfer Research

This refers to joint research performed at the developing country in which presently existing technology in Japan is modified according to the conditions actually found in said developing country. There are four projects carried over from last year in addition to which the new project "electronic standards" is being added.

3) Development Research

This is research in which the resources found within a developing country are analyzed comprehensively and systematically, their utilization potentials are studied from various angles, and the seeds for future special research and transfer research are laid. The two projects of "unused plant resources" and "product standardization" are being continued.

4) International Symposium

Technological development problems common to developing countries are discussed at an international symposium to which several panel members are invited from each country.

5) Inviting Foreign Technologists, Dispatching of Survey Groups, etc.

Foreign technologist trainees are accepted, supervisory people are invited, and survey groups are dispatched just as in the previous year.

International technology exchange related to cooperation with leading countries is being conducted during JFY 1979 through 102,014,000 yen budget along the following lines.

1) Provision of Basic Resources

Materials related to research cooperation along domestic and foreign lines are collected and analyzed and basic material will be provided to create long term vision of international research cooperation.

2) Sponsorship and Participation in International Conferences

Bilateral international cooperation along the lines of science and technology such as Japan-USA, Japan-France, Japan-Germany, and Japan-USSR together with multilateral international cooperation such as the IEA and OECD will be conducted with Japan sponsoring certain international conferences and participating in conferences held at the western countries.

3) Participation in Joint Activities and in Joint Research

The Agency of Industrial Science and Technology participates in joint activities related to research cooperation being conducted by IEA. It is expected that in addition to continued participation in the projects "coal technology information exchange," "solar heating and cooling," "hydrogen production from water," "wind power conversion system," and "energy cascading" there will be involvement in the new projects "artificial geothermal systems" and "new heat pump."

Other bilateral joint research will see efforts in new cooperative areas in addition to the "Japan-Australia coal liquefaction joint research" and the "Japan-USA geothermal energy joint research."

(Office of the International Research Cooperation Officer, Agency of Industrial Science and Technology)

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SCIENCE AND TECHNOLOGY

TECHNOLOGY ASSESSMENT PROGRAM OUTLINED

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 p 32

[Article by Technology Assessment Survey Section, AIST: "Promotion of Technology Assessment"]

[Text] Technology assessment (TA) involves the understanding and analysis from all conceivable angles of the effects of a given technology before it is applied and the consideration of the demands society would have of this technology to insure harmony between nature and society and thereby enable technology development that truly benefits man. This concept was created in the United States, and it may be said to be one of the methods of soft technology.

While there may be the effect of the situation at the time of its introduction to Japan, technology assessment is being stressed mainly as a scientific method to effectively counter environmental and safety problems. On the other hand, the effectiveness of TA is not simply in the extraction of plus-minus effects of various technologies, the study of countermeasures, and the overall evaluation. It also has the added effect of serving to determine the strategies to be used in establishing policies. For example, technology assessment is employed in the United States to establish the priorities in R and D policy and in comparisons between different R and D program problems.

The needs of society for the results of TA are increasing in this manner and never decreasing. In any event, the promotion of TA has become an important subject as one phase of industrial technology policy. Since 1971 this Agency has been setting up the basic machinery for the promotion of TA through pioneering efforts including development of methods of instruction and popularization of TA. It will continue in promoting reinforcement of policies through the application of TA methods to national projects and private industrial efforts making use of the results obtained to date. A sectional theme of TA will be contracted out to private think tanks in an effort to develop TA promotion capabilities in the private sector. The budget for JFY 1979 is 21,365,000 yen (JFY 1978 budget 21,339,000 yen).

Popularization of New Industrial Technology and Establishment of Its Enlightenment

In the past advances in technology have brought vast economic prosperity to the human society. On the other hand, introduction of the most recent technologies to society have created friction in a number of areas. As a result, the actual state of awareness of society toward technology was surveyed from the standpoints of technologists and technology itself during JFY 1978 to pinpoint problem areas as well as to research and develop specific management and policies to enhance social acceptance of technology and thereby enable the smooth introduction of new technology without creating undue friction.

A similar survey is being conducted during JFY 1979 from the standpoint of the people who are on the receiving end of this technology. The budget for JFY 1979 is 5,246,000 yen (JFY 1978 budget was 5,269,000 yen).

1) Actual Situation Surveys Related to Social Acceptability of Industrial Technology

Actual Concept and Actions of People to Technology, and Their Analysis

These subjects will be considered.

Information and reaction to individual technological developments

Reliability of information input sources with regard to industrial technology and of the information offered

Degree of awareness of science and technology in general

Outlook on future directions in science and technology

2) Survey Research on Specific Measures and Steps to Enhance Society's Acceptance of Technology

Approach of society to technology (study of participation system)

The following subjects will be considered.

Specific methods for social development (compe?)

Effectiveness of panel discussions, study groups

Significance of dual directional systems

Systematic study of industrial monitors, public hearings

Suitable observing, participating, and participation promoting facilities for open experiments

Organization of circle activities such as science clubs.

(Technology Survey Section, Agency of Industrial Science and Technology)

SCIENCE AND TECHNOLOGY

INDUSTRIAL TECHNOLOGY DEVELOPMENT PLANNING PROCESS

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 p 33

[Article by Technology Survey Section, AIST: "Preparing the Industrial Technology Development Long-range Plan"]

[Text] The Long-term Plan for Industrial Technology Development

The long-term plan for production technology development is one that is being continued from the long-term strategy policy for production technology development that has been promoted since JFY 1974. That is to say, the long-term strategy proposes a target date of about the 1990's by which time it is planned to resolve the resources and energy problem, environmental problem, and various other needs through a long-range planned approach involving the extraction of strategic technological development subjects and studies on long-range production technology policies. This long-range plan proposes and outline for the effective and comprehensive promotion of these strategic technology development subjects.

Outline of Plan

The proposed policy involves a 4-year period starting in JFY 1977 to develop the plan. The first 3 years will be taken up in clarifying the respective element technologies of the strategic technology development subjects, extracting the element technologies that should be developed, surveying the state of mutual relationships and technological development, predicting future trends, and surveying the technological development trends in other countries. At the same time, theoretical research to elucidate the mechanism of technology development for constructing the plan and theoretical research to develop the technology policy will be conducted. A comprehensive long term plan that takes into account sources of funding for technology development and technological needs will be drawn up in JFY 1980 with respect to the element technologies that need to be developed from the strategic technology development subjects. (See chart)

Operating costs of 31 million yen for JFY 1977, 30.5 million yen for JFY 1978, and 30.5 million yen for JFY 1979 have been budgeted.

Operating Plan for JFY 1979

The year 1979 is the 3d year of this 4-year plan, and it is planned to establish the intersecting subjects necessary for drawing up the long-term plan and complete studies on the individual technological subjects.

To this end, theoretical studies initiated in JFY 1977 on the intersecting subjects will be continued while studies will be conducted on social reaction to industrial technology, establishment of the framework of industrial technology policy, assignment of roles to the private sector, and special emphasis on individual technological subjects such as the food area, information area, and production technology area.

Flow Sheet for Long-term Industrial Technology Development Plan Establishment Process Flow



- Key: 1. study of intersecting subjects 2. mode of technology development vision
 3. understanding, analysis of actual conditions
 4. technological development trends
 5. examples of successes and failures in technology innovation
 6. actual state of the technology transfer market
 7. basic research performance
 8. social reaction to industrial technology
 9. technology suited to life stage
 10. theoretical research
 11. methods of analyzing element technology

Key to Flow Sheet continued:

12. survey research on evaluating long-term plan
13. analysis related to social economy versus technological levels, diffusion, and innovation
14. research on policy subjects
15. distribution of resources for technology development
16. manpower training
17. international technological development
18. setting framework for industrial technology policy
19. assignment of roles to private sector
20. public participation
21. study on individual technological subjects
22. energy conservation area
23. energy conservation technology
24. resources area
25. biomass technology
26. medical welfare area
27. medical treatment technology
28. urban society area
29. deep tunnel construction
30. disaster prevention area
31. unmanned rescue system
32. environmental area
33. waste treatment using microorganisms
34. food area
35. food synthesis exploiting biocapabilities
36. information area
37. optics computer
38. production technology area
39. study control system
40. Establishment of Long-term Plan
41. set up comprehensive long-term industrial technology development plan taking into account the purpose, practicalization period, objectives, interrelationships between element technologies, development system for element technologies, funds, and methods of promoting technology policy to be developed by the year 2000
42. JFY 1979
43. JFY 1980

(Technology Survey Section, Agency of Industrial Science and Technology)

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CS0: 8129/1239

SCIENCE AND TECHNOLOGY

COMPUTER UTILIZATION TECHNOLOGY RESEARCH COMMITTEE

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 34-35

[Article by General Affairs Section, AIST: "Development of Electronic Computer Utilization Technology"]

[Text] General Account 64,369,000 yen

Outline

The "technology research committee on utilization of electronic computers" (hereafter called "utilization research") has the mission of conducting survey research from many-angled and specialized approaches on the utilization of electronic computers as seen from the technological side. This committee was activated in JFY 1968 and is presently comprised of three divisions and 10 research sections (see list of ministries and agencies on participation list). It is conducting active research on the utilization of electronic computers with the participation of experienced and academic personnel.

The research activities of this committee can be broadly classified in the following manner.

- 1) Survey research on various technological problems associated with the utilization of electronic computers by government ministries and agencies
- 2) Development of electronic computer utilization technology common to the different government ministries and agencies

In addition, it conducts various other activities such as

- 3) Training in the area of leading technology through the dispatching of trainees overseas and convening joint publicizing group for results of development technology of the various government ministries and agencies including this research committee.

Operating Plan

The following research activities according to various specialty areas for the utilization of electronic computers will be conducted in order to greatly

improve electronic computer utilization technology at government ministries and agencies and set up a system that will respond to new technological advances during JFY 1979.

1) Utilization Technology Division

i) Program technology research section

Accompanying the advances in information distribution at the government ministries and agencies and the increasing demand for software, the production capability and reliability of software are becoming major problems due to the increase in scale and complexity of software. In order to counter this situation, survey research will be conducted on technology to improve software productivity and thereby enhance production capability and reliability of software development.

ii) Operating system research section

The use of minicomputers is increasing in order to enable dispersion treatment and communication control as the use of networks becomes more popular. At the same time, the hardware area is seeing the appearance of units of fairly high performance. Survey research on utilization technology will be conducted centered on operating systems of minicomputers based on this situation.

iii) On-line system research section

Survey research will be conducted on improving network architecture compatibility and standardization of networks presently being publicized in order to understand the problem areas and subjects associated with on-line systems at the government ministries and agencies.

iv) Data base research section

Survey research will be conducted on data base capabilities such as formation capability of various data bases, search capability, and replacement capabilities along with survey research on on-line interface and data base supervision technology to enable effective utilization of data bases in the hands of the government ministries and agencies.

2) Peripheral Problems Division

v) Peripheral problems research section

Survey research will be conducted on methods for the systematic processing of information between information utilizers in the guise of administrative personnel and the information proposer who is the information processing member who is in information management such as the assignment of the technological role the information treatment group in order to enable effective utilization of information and realize greater level of information processing.

vi) Systems research section

The manner in which the government ministries and agencies use electronic computers has shifted from the batch processing of the past to on-line processing in which the user directly inputs data from a terminal and survey research on system operating management to counter problems such as obstructions.

Program development on "clearing information subsystem" will be conducted to provide information on data storage sources and promote smooth and effective inter-utilization of data under a resource sharing system.

vii) Data code research section

Survey research will be conducted on data distribution centered on coupled utilization of data for effectively utilizing statistics to respond to various administration demands by the mutual utilization of data compiled by the various government offices.

viii) Resources sharing system research section

Survey research will be conducted on the formation of resources sharing systems such as on operation management to actuate resource sharing systems utilizing computer resources (data, software) in the hands of the various government offices. In addition, experimental analysis on the protocols for completed development will be conducted.

Theoretical design of a "network access command protocol" that offers standardized access commands to enable ready utilization of various capabilities such as interactive processing, remote processing, or file transmission processing using a network from terminals will be conducted.

System design and program development for "data base access protocol" will be made in order to utilize various data bases connected to the network from a terminal.

3) Developmental Research Division

ix) Statistical system development research section

Up to the present a number of everyday use systems have been developed in order to efficiently conduct statistical information processing. Survey research will be conducted on statistical processing through the use of the optimum input-output equipment in various statistical processes in order to enable even more efficient statistical information processing.

x0 Character information system development research section

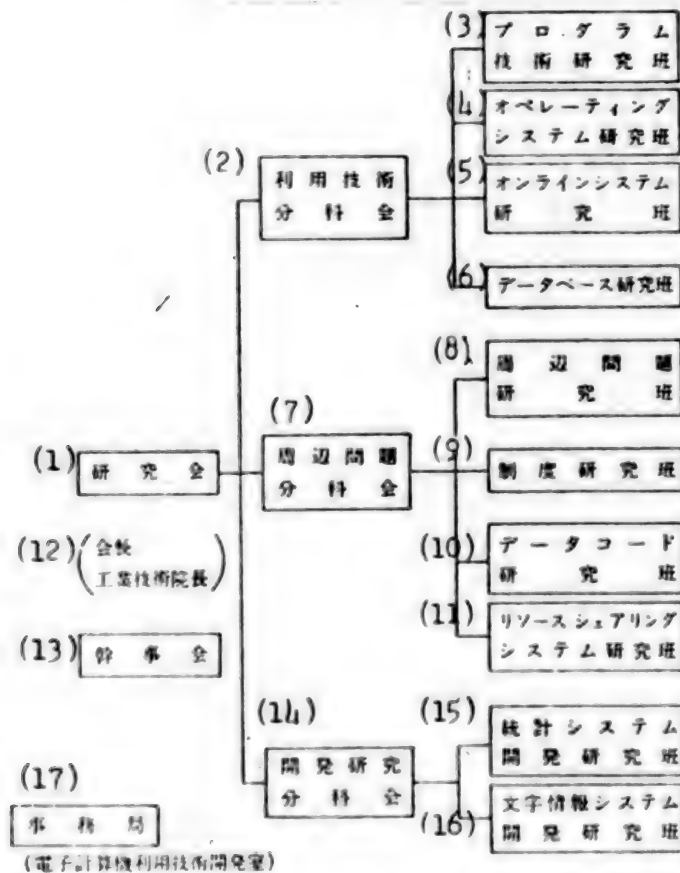
Survey research will be conducted on language processing technology necessary to conduct automated retrieval of Japanese language information, automated indexing, and interactive processing in Japanese.

Program development on an "automated word extraction system" will be promoted to extract words from a Japanese text, a basic and common technology for search and automated retrieval of information.

In addition to the activities of the various research sections described above, the following other activities will be promoted.

- i) Dispatch of trainees overseas to training in advanced foreign technology
- ii) Sponsor general meetings and joint announcement meetings, dissemination of research results

Organization Chart



- Key:
- | | |
|--|---|
| 1. research organization | 2. technology utilization division |
| 3. program technology research section | 4. operating system research division |
| 5. on-line system research section | 6. data base research section |
| 7. peripheral problems division | 8. peripheral problems research section |
| 9. systems research section | 10. data code research section |
| 11. resources sharing system research section | |
| 12. (chairman, chief of Agency of Industrial Science and Technology) | |

Key to Organization Chart continued

- 13. board of governors
- 14. development research division
- 15. statistical system development research section
- 16. character information system development research section
- 17. Admin Bureau (electronic computer utilization technology development office)

Roster of Ministries and Agencies Participating in the Research Organization

1 全 計 検 査 院	15 社 会 保 険 庁
2 人 事 院	16 農 林 水 産 省
3 総理府(人事局・統計局)	17 食 糧 庁
4 警 察 庁	18 通 商 産 業 省
5 行 政 管 理 庁	19 工 業 技 術 院
6 防 衛 庁	20 特 許 庁
7 経 済 企 画 庁	21 運 輸 省
8 科 学 技 術 庁	22 商 上 保 安 庁
9 法 務 省	23 気 象 庁
10 外 務 省	24 郵 政 省
11 大 蔵 省	25 労 働 省
12 国 税 庁	26 建 設 省
13 文 部 省	27 自 治 省
14 厚 生 省	

28以上27省庁

29 4 プラバ 参加 最高裁判所 国立国会図書館 日本科学技術情報センター

- Key:
- 1. Board of Audit
 - 2. National Personnel Authority
 - 3. Prime Minister's Office (Personnel Bureau, Statistics Bureau)
 - 4. National Police Agency
 - 5. Administrative Management Agency
 - 6. Defense Agency
 - 7. Economic Planning Agency
 - 8. Science and Technology Agency
 - 9. Ministry of Justice
 - 10. Ministry of Foreign Affairs
 - 11. Ministry of Finance
 - 12. National Tax Administration Agency
 - 13. Ministry of Education
 - 14. Ministry of Health and Welfare
 - 15. Social Insurance Agency
 - 16. Ministry of Agriculture, Forestry, and Fisheries
 - 17. Food Agency
 - 18. Ministry of International Trade and Industry
 - 19. Agency of Industrial Science and Technology
 - 20. Patent Office
 - 21. Ministry of Transport
 - 22. Maritime Safety Agency
 - 23. Meteorological Agency
 - 24. Ministry of Posts and Telecommunications
 - 25. Ministry of Labor
 - 26. Ministry of Construction
 - 27. Ministry of Home Affairs
 - 28. above listed 27 ministries and agencies
 - 29. observer participation; Supreme Court, National Diet Library, Japan Science and Technology Information Center

(General Affairs Section, Agency of Industrial Science and Technology)

SCIENCE AND TECHNOLOGY

LIST OF LABORATORY SPECIAL RESEARCH PROJECTS GIVEN

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 p 36

[Article by Research Operation Section, AIST: "Laboratory Special Research"]

[Text] The 16 laboratories under the jurisdiction of the Agency of Industrial Science and Technology conduct "ordinary research" in the form of basic research designed to promote the country's economy and improve its people's welfare and "special research" which is research and development related to technology necessary to international trade and industry administration that requires research of a particularly large scale as well as research requiring very rapid resolution.

As shown in the table below, special research on 196 themes, including 44 new themes, under 22 large research categories will be conducted during JFY 1979 in addition to which there are six themes on comprehensive bionics research contracted out to universities.

Among these research themes is research on "earthquake prediction technology" that is being conducted in cognizance of the large social problem that major earthquakes can cause as evidenced by the recent earthquake off the Miyagi Prefecture coast, and this is a problem that needs early resolution for safeguarding the nation's people. In addition, safety measures against gas in deep mine operations involving coal mines and other mineral mines are being developed, and research is being promoted with emphasis on "safety and protection technology" against "industrial complex disasters."

Among the production related themes are expansion of "industrial foundation establishment technology" that will serve as the basis for development of social economy and on "resources and utilization technology" aimed at the effective utilization of previously unused resources such as shirasu that is being newly developed.

Research on methods of reinforcing light weight metal composite material coming under the general category of "residential related technology" is being continued in the area of living related subjects. At the same time, research on (prosthetics?) and development of artificial eyes for the blind are being

promoted in the area of "consumer science technology." In addition, original research on "electronics technology" such as on lasers or information processing technology, "comprehensive bionics research" such as on biological polymers, and "new materials technology" on ultra materials is being promoted for the development of unexplored areas that are expected to become resources for the next generation. At the same time, the national research organs are conducting research on setting up technological standards necessary for administration, and "standards establishing technology" and "inspection and certification technology" for establishing, maintaining, and supplying standards.

Special research under funds other than the Agency of Industrial Science and Technology budget include research on melt forging methods of nonferrous metals and high quality rotary forged products through "medium and small industries technology" (Small and Medium Enterprises Agency account) and "product quality and ideas improving technology" and through the International Trade Administration and Bureau account in order to improve the technological levels of small and medium industries.

There have been 16 new themes added in the area of "pollution prevention technology" through the "Environmental Agency accounts" in which emphasis is placed on diesel exhaust countermeasures and countermeasures against the red tide. In addition, research will be conducted on water pollution prevention technology and pollution measurement technology.

"Peaceful Use of Nuclear Energy Technology" under the "Science and Technology Agency account" related research is focused primarily on nuclear fusion related studies in which research in nuclear fusion reactions (high beta plasma) and on nonferrous metals for use in nuclear fusion reactors along with research on superconducting magnets for nuclear fusion use are being continued. A new project on damage to organic materials has been started.

Overview of Special Researches by Items

(Unit: million yen)

1 研究項目	254年度 テーマ数	54年度要求額	453年度予算額
5工業標準化	14	69	(67)
6標準・検査技術	10	289	(243)
7安全・保安技術	7	198	(203)
8地震予知技術	4	179	(111)
9資源開発利用技術	9	152	(164)
10海洋資源開発技術	9	239	(263)
11住宅関連技術	3	53	(65)
12消費科学技術	6	75	(76)
13微生物応用技術	2	49	(47)
14バイオニクス総合研究	13	313	(285)
15新材料技術	8	127	(129)
16高分子工学技術	6	81	(93)
17触媒技術	3	72	(68)
18産業基盤確立技術	7	107	(112)
19システム工学応用技術	5	101	(100)
20電子技術	9	661	(596)
21宇宙開発関連技術	3	89	(73)
22小計	118	2,854	(2,694)
23研究促進	-	185	(175)
24計	-	3,040	(2,869)
25バイオニクス総合研究委託	6	12	(13)
26合計	124	3,051	(2,882)
27公害防止技術	52	1,906	(1,808)
28原子力平和利用技術	8	642	(499)
29中小企業対策技術	11	93	(91)
30製品の品質及び生産向上技術	1	11	(11)
31小計	72	2,652	(2,409)
32合計	196	5,703	(5,291)

- Key: 1. research item 2. number of themes for JFY 1979
 3. funds requested for JFY 1979 4. JFY 1978 budget
 5. industrial standardization 6. standards, inspection technology
 7. safety, protection technology
 8. earthquake prediction technology
 9. resources development, utilization technology
 10. ocean resources development technology
 11. home related technology 12. consumer science and technology
 13. microorganisms application technology
 14. comprehensive bionics research 15. new materials technology
 16. hyhpolymer engineering technology 17. catalyst technology
 18. industrial foundation establishment technology
 19. system engineering application technology 20. electronics technology
 21. space development technology 22. subtotal
 23. research promotion 24. total
 25. contracted comprehensive bionics research 26. total
 27. pollution prevention technology
 29. medium and small industries countermeasures technology
 30. product quality and design improvement technology
 32. total

(Research Operations Section, Agency of Industrial Science and Technology)

SCIENCE AND TECHNOLOGY

MITI'S TECHNOLOGY RELATED MAJOR BUDGET ITEMS OUTLINE

Tokyo KOGYO GIJUTSU in Japanese Vol 20 No 3, Mar 79 pp 37-39

[Article by Technology Survey Section, AIST: "Ministry of International Trade and Industry Technology-related Major Budget Items"]

[Text] Comprehensive Preconstruction Survey Industrial Pollution (Industrial Siting and Environmental Protection Bureau) General Account: 124 million yen

Based on the factory siting law, preconstruction surveys will be performed on atmospheric and water qualities and on wastes preceding any incidence of pollution in order to forestall industrial pollution at areas where it can be expected that a number of factories will be concentrated in order to enable smooth siting.

"Operational Plan"

A special committee has been formed in the pollution section based on the plant siting law to study the contents of surveys and the survey methods at the targeted siting area for comprehensive preconstruction surveys on industrial pollution, and the survey will be based on the results of these studies.

(Survey Contents)

- 1) On-site surveys will be conducted on atmospheric related items at five areas, and the results of these surveys will be used in wind tunnel experiments and electronic computer simulation to make prediction of pollution.
- 2) On-site surveys will be conducted at four ocean areas and one river basin with regard to water quality, and the results of these surveys together with the industrial development will be the basis for conducting model hydrological experiments and predict the degree of pollution of ocean areas and degree of diffusion of warm water discharge.

Health Care Network System Development

(Machinery and Information Industries
Bureau) General Account 109 million yen

The present situation of medical treatment that is the main stream of high level sophisticated society is beset with increase in overall medical costs and lowered medical treatment services. In addition to the above, it is expected that demand for medical treatment will increase in the future. In order to quickly and efficiently handle these large volumes of high level requests, establish comprehensive medical treatment systems, and rationalize the operations of medical treatment organs simultaneously, the results of various technologies will be combined and hospitals, clinics, medical centers, examination centers, and other medical treatment organs will be tied together through an information system centered on the computer. In this manner, a health care network system will be developed that will enable one dimensional utilization of health management data and joint utilization of high level medical treatment technology.

Daily Life Imagery Information System Development

(Machinery and Information Industries Bureau)
General Account 32 million yen

Two-directional Imagery information system will be developed in which a computer and imagery equipment are coupled with an optical transmission pathway in order to respond to requests for promoting regional communication and fulfill requests for subjective selection of information and thereby accede to the people's need for information that is becoming more varied by the day.

"Operational Plan"

Actual promotion of development is being performed by the Daily Life Imagery Information System Development Association (Inc.) (under joint jurisdiction of the P & T and administrative ministries), and an 8-year plan starting in JFY 1972 is being promoted. Terminal equipment introduced at various sites were put into operation during JFY 1978 to initiate system experimental operation and conduct system evaluation. Experimental evaluation is being planned at Higashi Ikikoma in Nara Prefecture starting in JFY 1979.

Development of VLSI for Next Generation Electronic Computers

(Machinery and Information Industries Bureau)
General Account 8.61 billion yen

There is need for Japan to rapidly develop electronic computers to counter the new IBM series FS computers that will follow the 370 series. Within this framework, there is need to hasten the development of the VLSI that is the core of this technology. The research system will be directed for unification to enable this development, and aid will be given the VLSI technology research group.

Next Stage Civil Transport Engine Development

(Machinery and Information Industries Bureau)
General Account 5.33 billion yen

Development will be promoted on the next stage civil transport YX in order to foster Japan's aircraft industry and contribute to upgrading the industrial structure.

"Operational Plan"

Preparations for tests and design necessary to YX development will be promoted, and a situation will be established to enable smooth shift to joint international research once the various conditions are realized.

Development of Energy Conserving Urban Machinery System

(Machinery and Information Industries Bureau)
General Account 9 million yen

The costs of energy and water in cities have been steadily increasing over the recent years, and there is need for energy conservation and water conservation policies. At the same time, the population of cities is expected to increase even more in the future, and economic and efficient building management along the lines of the necessary electric power, gas, tap water, sewer, local heating and cooling, and communication related construction costs of urban facilities are becoming necessary.

An energy conserving urban mechanized system that ties together local energy centers to handle solar house and waste management and an IUC (urban integrated system circuit) that distributes water and material flow from the energy centers must be developed in order to resolve these problems.

"Operational Plan"

Research and development will be promoted on interchange technology of various energies accompanying urban mechanical systematization, effective utilization technology of waste heat, and comprehensive enclosure technology of various urban facilities.

Software Production Technology Development

(Machinery and Information Industries Bureau)
General Account 1.522 billion yen

The fraction of computer cost taken up by software has been rapidly increasing, and the efficient development of software has become a national economic problem. A quasi-automated programming system will be developed in order to resolve this situation and close the software gap between the United States and Japan.

Development of New Home Supply System

(Consumer Goods Industries Bureau)
General Account 9 million yen

In addition to conducting survey research on items necessary to new urban residences designed to insure high degree of land utilization and good living environment in cities, industrialization guidance will be given to the results on new supply system development (House 55) that were collected up through the previous year.

Solar System Promotion Measure

(Consumer Goods Industries Bureau)
General Account 68 million yen

In the course of popularizing solar systems (solar heat utilization heating, cooling, and hot water supply facilities), differences are expected to arise in the amount of energy saved and methods of maintenance and control according to variations caused by geographical conditions on the weather conditions and applications.

Research on solar systems of high reliability that can adapt to the weather conditions of different locales will be promoted in order to counter this situation. Solar systems will be installed in public facilities (schools, hospitals, etc.) and surveys on technological conditions related to practicalization of the measurement of heat collected will be contracted out and executed.

Surveys on Standardization of Nuclear Power Generation Technology

(Resources and Energy Agency)
General Account 280 million yen

Standardization of improved nuclear power generation will be promoted to enable disengagement from technology importation from the United States and greatly improve safety and reliability. In addition, technology standards will be established that reflect the most recent nuclear power technology.

"Operational Plan"

- 1) Survey studies will be conducted on those subjects that require comparatively long term technological evaluation (use of electric powered CRD, improved method for removing reactor vessel cover).
- 2) Standardization of earthquake resistant design and survey aimed at standardizing the rest of the plant.

Survey on Practicalization of New Type Reactor for Power Generation

(Resources and Energy Agency)
General Account 295 million yen

The light water reactor that has been brought to the practical stage in Japan utilizes but roughly 1 percent of the energy in its fuel, and its thermal

efficiency is of the order of 33 percent. Surveys to demonstrate the utilization of plutonium in light water reactors will be conducted and technological standards will be established for heavy water reactors from the standpoint of effective utilization of nuclear fuels.

"Operational Plan"

1) Demonstration Survey on Utilization of Plutonium in Light Water Reactors
Surveys and designs will be made in order to demonstrate the stability, reliability, and economy when plutonium fuel is actually used in a light water reactor.

2) Surveys for Establishing Technological Standards for New Type Reactors

Following the trends in heavy water reactors being developed in foreign countries, the safety of these reactors will be demonstrated independently in Japan. At the same time, plans will be laid to establish technological standards of heavy water reactors that will be the base for technological examinations.

Spent Nuclear Fuel Measures Survey

(Resources and Energy Agency)
General Account 22 million yen

There is need to quickly establish activities along the lines of reprocessing spent fuel, collecting and fabricating the plutonium recovered, and managing and disposing high level wastes that are the back end components of the nuclear fuel cycle in order to enhance nuclear power development. A comprehensive assessment of the reprocessing related activities will be made in this regard.

"Operational Plan"

The back end activities such as reprocessing plants will be placed at joint sites in the form of nuclear fuel parks in which course the technological and economic aspects will be sifted in the assessment of the nuclear park concept that is considered optimum.

Radioactive Waste Disposal Measures

(Resources and Energy Agency)
General Account 72 million yen

Accompanying the increase in scale on nuclear power generation is expected to be a massive accumulation of radioactive wastes that will be generated, and there is need to quickly establish its treatment and disposal system. Feasibility surveys will be conducted on the industrialization of this treatment and disposal together with experiments to demonstrate the safe disposition of radioactive wastes and dispel any anxiety on the part of the people.

"Operational Plan"

Feasibility surveys on the industrialization of low level waste treatment and disposal will be conducted in JFY 1979 in continuation of the previous year

and demonstration experiments to show that the radioactive wastes presently stored in the nuclear power plants and their custodial system are safe from all conceivable standpoints will be contracted to the Nuclear Power Environmental Service Center (Inc) which will perform the necessary experiments.

New Mineral Bed Prospecting

(Resources and Energy Agency)
General Account 1.4 billion yen

There is need to plan all out activity to maintain operation of domestic mines as stable source of supply of basic raw materials and also maintain the local society. Medium and small mines account for a substantial fraction of these domestic mines, and planned and effective prospecting will be conducted in the mining districts in order to effect cost down of discovering new mines and to maintain them.

"Operational Plan"

Subsidies will be provided for new mineral bed search including shaft construction and tests conducted by medium and small mines.

Establishing Local Industry Promotion and High Class Technologist Training System
(Small and Medium Enterprises Agency)
General Account 38 million yen

Training will be conducted that will serve to provide high level and comprehensive technology and promotion of local industries through the training of people with the basic academic background that will enable high-level and high-value product production of local industrial products through improved quality of medium and small enterprise technologists.

Expansion of Machine Development Works

(Small and Medium Enterprises Agency)
General Account 110 million yen of
which 105 million yen is for specific
local industry

A specific local industry ("mesh kiln for mosaic tile" development) will be newly established as one phase of the machine development industry by the Smaller Enterprise Promotion Corp [Jigyodan] and development will be promoted over a 2-year period with a budget of 110 million yen.

Expansion of Special Research and Development Projects

(Small and Medium Enterprises Agency)
General Account 214 million yen

The two themes of "safe automated system for cast finishing industry" and "printed circuit board production plant" will be the subjects of research and development in continuation of JFY 1978 as special research and development projects of the Smaller Enterprises Promotion Corp.

Expansion of New Technology Demonstration Projects

(Small and Medium Enterprises Agency)

General Account 90 million yen

The Smaller Enterprises Promotion Corp will promote industrialization of new technology through new technology demonstration projects in which the initial year will be taken up in development of machinery and equipment and the second year in operational research, disclosure, and popularization of various themes in order to promote industrialization of new technology development by public experimental research organs among small and medium enterprises. The following themes are expected to be exploited during JFY 1979.

a. Development of machinery and equipment

1) Manufacturing technology of pulp sediment and light weight fireproof perlite board

2) Roll forging technology for producing metal tableware knife

b. Operational research, disclosure, and popularization

1) Technology for developing mica resources

2) Natural fiber dry transfer printing technology

(Technology Survey Section, Agency of Industrial Science and Technology)

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